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Aviation Week

ABP Member ABC

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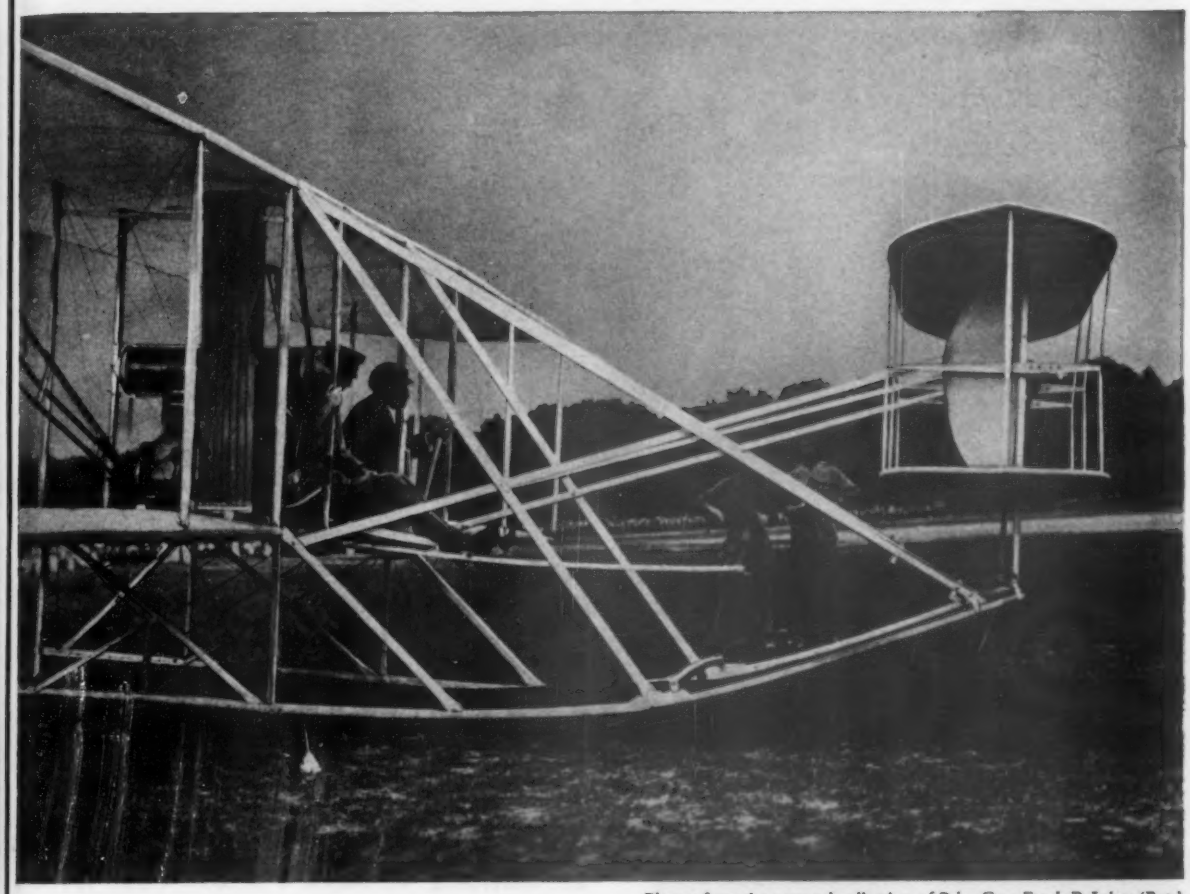
Air History in the Making—1909



Picture from the personal collection of Brig. Gen. Frank P. Lahm (Ret.)

Here begins the U. S. Air Force! Date—July 27, 1909. Orville Wright (at controls) took off for 1 hour, 12 minutes, 40 seconds with Lieut. Frank P. Lahm, a noted early balloonist, as official observer. This flight over Fort Myer parade ground met U. S. Army duration specifications.

Three days later, Orville Wright flew to Alexandria, Va. and back non-stop with Lieut. Benjamin D. Foulois observing. This 10 mile flight at 42.6 miles per hour won the Wrights a $5,000 bonus over the $25,000 paid them by the U. S. Government. President William Howard Taft personally congratulated the Wrights on their magnificent achievement.

American air power today owes a great debt to Army air pioneers, Lahm and Foulois, who later became generals in recognition of their vision and leadership in the air. As Army aviation developed under their guidance, petroleum research kept pace with demands for more power and better lubrication.

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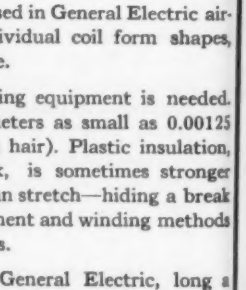
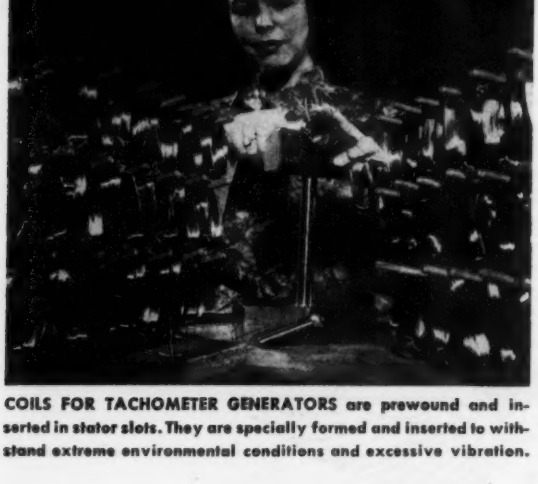
Phillips 66

AVIATION PRODUCTS

OPERATOR WINDS POSITION-INDICATOR COILS—WIRE FEEDS AT 600 RPM AROUND SQUARE COIL FORMS.



PRECISION COIL WINDING



COILS FOR TACHOMETER GENERATORS are prewound and inserted in stator slots. They are specially formed and inserted to withstand extreme environmental conditions and excessive vibration.

Special winding machines required to handle 0.00125-inch coil wires

Coils of varying types and sizes are used in General Electric aircraft instruments. Each has its individual coil form shapes, number of turns, and diameter of wire.

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This is just one example of how General Electric, long a leader in precision-instrument-manufacturing techniques, has applied its engineering and manufacturing facilities to provide accurate, dependable aircraft instruments. For information about available instruments, contact your G-E aviation specialist or write Section 607-24, General Electric Company, Schenectady 5, New York.

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NEWS DIGEST

DOMESTIC

Harmon International Aviation Trophy for 1950, annual award to the world's outstanding aviator, was presented to USAF Col. David C Schilling. Awards made last year, covering the decade from 1940 through 1949, went to Lt. Gen. James H. Doolittle, Jacqueline Cochran, and Vice-Admiral Charles E. Rosendahl.

New engineers at Boeing Airplane Co. are now given a three-weeks indoctrination in company engineering problems before being assigned to a specific job. At present, Boeing has approximately 3,000 graduate engineers on its payroll and hopes to increase that total to 4,500 by the end of 1952.

Republic Aviation Corp., Farmingdale, L. I., will halt manufacturing operations for two weeks beginning Saturday, Aug. 4, for the company's annual two-week vacation.

Fourth and Fifth armed forces subcontracting exhibits will be held in Cleveland's armory July 24-28 and in St. Louis' Kiel Municipal Auditorium, July 30-Aug. 3. The Cleveland exhibit is designed to give small businessmen in the surrounding territory of Ohio, Kentucky and Michigan opportunity to see which items of military production they can manufacture as subcontractors. The St. Louis exhibit is to assist those living in Missouri, Nebraska and Iowa.

Shipment of 232 personal and executive planes of one to 10 places, with total value of $1,759,000, was made by nine companies during May. This compared with 231 worth $1,592,000 shipped by 11 companies in April. May shipments included 177 four or more place, 52 two place, and 3 one place. Total number of executive and personal planes shipped during January-May period was 1,210, valued at $8,877,000.

Six-man Airframe Committee of the Wage Stabilization Board is to hold its first meeting in Los Angeles July 12. The committee is headed by Howard S. Kaltenborn of the University of California, formerly of Curtiss-Wright. It is under instructions from WSB to determine whether the airframe industry's stabilization problems are of sufficient importance to mobilization to require special procedures or other treatment, and, if so, recommend what should be done. The committee is also to propose a definition of the airframe industry to be used by WSB.

Harry L. Erlicher, General Electric Co. vice president, has been named special assistant to Undersecretary of the Army Archibald S. Alexander. Erlicher, who will have charge of Army procurement and production expediting in Alexander's office, has been a part-time consultant on procurement matters for the Undersecretary since January, 1950.

Uunited Air Lines' DC-6 crashed into Crystal Mountain, near Ft. Collins, Colo., June 30, killing all 45 passengers and crew of five. The plane had left San Francisco and the pilot's last report was that he was coming down for the scheduled landing at Denver. Weather reportedly was good.

Two informations have been filed by the U. S. Government against Colonial Airlines and its former president, Sigmund Janas, Sr., charging violations of the Civil Aeronautics Act (AVIATION WEEK July 2, p. 51). Each information contained 40 counts.

FINANCIAL

Consolidated Vultee Aircraft Corp has reported income of $5,905,322 before taxes and $4,133,322 after taxes for the first six months, ended May 31, of the current fiscal year. Sales for the six months totaled approximately $145 million.

Capital Airlines has shown a May operating profit after taxes of $300,543 and a net profit after taxes of $135,771. Total operating revenue of $3,404,000 was the highest ever reported by the carrier for one month.

Northwest Airlines has made a $1-million payment due July 1 on its outstanding 4-percent bank loan, reducing long term indebtedness to $15,140,363. The carrier borrowed the final amounts of a $21-million bank loan in April, 1950, and at the end of last year the outstandings had been paid down to $17,140,363.

INTERNATIONAL

Australian Commonwealth has been licensed by North American Aviation, Inc., to build the F-86E Sabre fighter. The Australian-built F-86s are to be powered by a British turbojet engine and will be used by the RAAF. This is the second Sabre license to have been issued by NAA, the first going to Canadair, currently building F-86Es for the RCAF.

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SIDELIGHTS

Washington Talk

CAB people last week claimed the long-awaited **New York helicopter decision** would be out "in a week or so." . . . The **UAL strike** was fast-becoming an Administration hot potato. White House & Congress were receiving ever-stronger demands from the Pacific Coast public to "do something" about getting homeward-bound Korean veterans out of coast ports, especially in the Pacific Northwest, where they were piling up faster than other airlines could handle them. . . . Although it denies having taken official action, CAB nevertheless "advised" **local service airlines** using single-engined planes to return to twin-engined craft. . . . You hear in Washington that the recently-installed **Joe Adams** is the Board's most open-minded member on the subject of giving nonscheduled lines a chance. . . . Behind the continued reports of coolness between Assistant Secretary of Commerce Rentzel and **CAB Chairman Nyrop** is Nyrop's determination to be known as an independent thinker, rather than a rider of Rentzel's coat tails up the promotion ladder. . . . **Marquis Childs**, syndicated columnist, has run two or three more articles insinuating that CAB should be investigated for giving in to industry "pull."

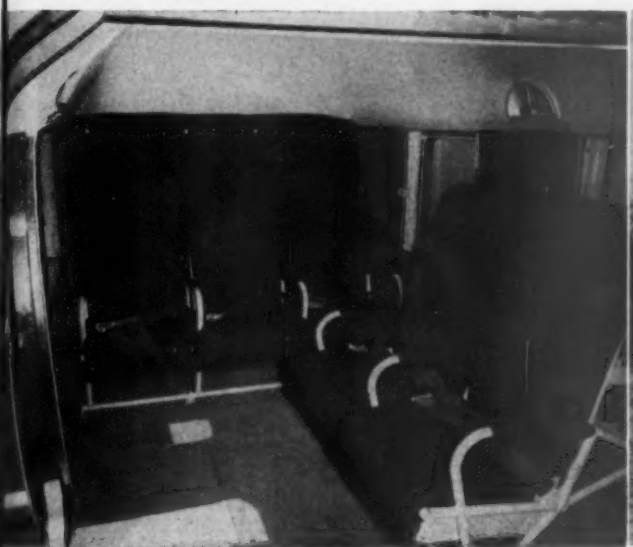
Air Force

Lt. Gen. Stratemeyer was able to sit up last week for the first time since his heart attack May 20. . . . Three **B-36s flew to France** from their British base to pass over the opening International Aero Exhibition, then flew over Brussels, The Hague and Luxemburg en route back to England. It was the first time B-36s had appeared over the continent. . . . USAF and 2,000 airmen are testing three light-weight **.38-caliber revolvers** as possible replacements for the present .45 automatic, which weighs 39 ounces. Smith & Wesson submitted two versions, a 5-shot weighing 10½-oz., and a 6-shot weighing 14-oz. Colt submitted a 6-shot weighing 11¼-oz. . . . Air Force Secretary Thomas Finletter, just back from Korea, told a press conference that despite possibility of peace, the **Red air force** was massing planes in the North Korea-Manchuria area in increasing numbers. Oct. 1950 estimates placed Chinese & Korean Red plane strength at some 200 planes, but this has been upped five-fold, he said. About 1,000 Red craft are in the zone, mostly MiG-15s.

Air Admirals Win

Navy's decision to have a full-size "elevator island" on its new **57,000-ton carrier**, the Forrestal, is a victory for air admirals over ship admirals. Vice Adm. Cassady, Deputy Chief of Naval Operations for Air, wanted the removable island to make a flush deck for landing and take-off of large planes and night operations. But Vice Adm. Duncan, another Deputy Chief of Naval Operations, objected this was too expensive, and proposed a small permanent navigation island.

DRESS REVIEW—Thirteen Bell H-13D copters awaiting delivery to Army Field Forces line up at Niagara Falls (N. Y.) Municipal Airport in smart array. They are scheduled for shipment to Korea, where the helicopter has proven to be indispensable for evacuating wounded from otherwise inaccessible locations. Skid-gear is useful because of rough terrain.



PLUSH S-55—Westland-Sikorsky S-55 demonstrator (above) has eight seats to show how it would appear in commercial use. There are three seats in cabin rear, three in front and two more in the center. There's plenty of space.

KAMAN AMBULANCE—Hinged nose on Kaman Navy HTK-1 permits quick, straight-through loading of a litter, after removal of left seat and cyclic stick. Drop seat behind pilot can hold attendant or a walking casualty.

Ins and Outs Of U.S. Copters

NEW LITTER CARRIER—Designed by Bell Aircraft, this aluminum structure litter platform has a Plexiglas cowl. Previous, fully enclosed "coffin" type carriers were psychologically unsuitable because they engendered claustrophobia. A chlorophrene-coated Nylon fabric protects the lower body.

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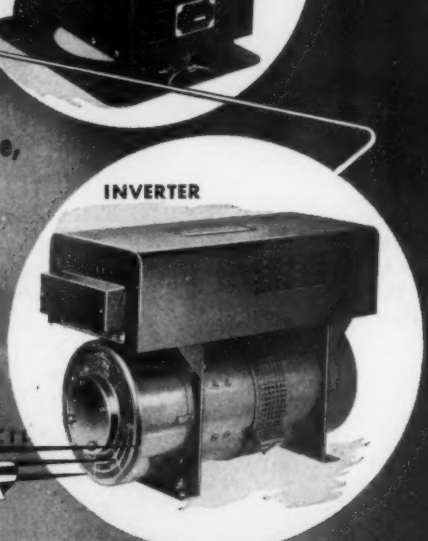

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WHO'S WHERE

In the Front Office

S. Floyd Stewart has been named executive vice president of Arma Corp., Brooklyn, N. Y., wholly owned subsidiary of American Bosch Corp. Stewart joined Arma June 18th, coming from Leece-Neville Co., Cleveland, where he had been president and general manager since 1949.

Rollin M. Russell has joined Radioplane Co., Van Nuys, Calif., as vice president. Formerly chief engineer of Bendix Pacific division's development laboratory, Russell prior to that was connected with Johns Hopkins physics laboratories and Columbia University's underwater sound laboratory.

Luther Harris has been made vice president-production of Pacific Airmotive Corp. Harris joined PAC last year, during World War II worked on major maintenance projects for USAAF throughout the world.

W. D. Espy has been named a vice president of Lear, Inc., Espy is manager of the LearCal office in Los Angeles, where the company manufacturers aircraft radios and autopilots.

Fred W. Caton, formerly operations manager of California Eastern Airways, has been elected vice president in charge of operations at Oakland for the carrier, and Neil Berboth has been designated vice president-planning and research, in addition to his present duties as CEA secretary.

Changes

D. R. Shoults, director of engineering for Aro, Inc., St. Louis, Mo., has been appointed director of General Electric Co.'s nuclear propulsion project for the USAF and AEC. Shoults is scheduled to begin his new duties Aug. 1, and the project, which covers further development of an atom-powered engine for aircraft, is to be headquartered at GE's Lockland, Ohio, turbojet center.

Lewis E. Gage has been named advertising and sales promotion manager for Burndy Engineering Co. . . . **Walter Tydon** has been designated chief engineer for Fairchild Aircraft division, **Lynn G. Walck** has been named manager of the division's industrial relations department, and **Harold K. Pedersen** has been appointed assistant treasurer.

A. Jean Maurel has been designated sales representative for Northwest Airlines in New York.

Honors and Elections

R. C. Taylor, a vice president of American Can Co., has been elected a director of Republic Aviation Corp. . . . **Robert E. Caskey,** vice president-west coast operations for California Eastern Airways, has been named to the carrier's board. . . . Three new members were elected to the board of Frontier Airlines: **C. A. Myhre, Donald A. Duff** and **L. W. Linville,** replacing **Col. Matt Baird, Frank D. Beiser** and **Sam Snead.**

R. R. LaMotte, chief engineer of the Aeroproducts division of General Motors Corp., has been elected an associate fellow of the Institute of the Aeronautical Sciences.

INDUSTRY OBSERVER

► Air Force Senior Officers Board has completed study of proposals submitted by Lockheed, North American, McDonnell, Republic and Consolidated Vultee for airframe design of the "54 interceptor." Report is that Convair was named winner and Republic placed second. This is the second half of a packaged requirements assignment dealt out by USAF to electronics and aircraft industries calling for a fully automatic sonic-speed interceptor capable of carrying an air-to-air missile and a pilot monitor. Hughes Aircraft (AVIATION WEEK, Jan. 15, p. 11) early this year was named winner among the electronics competitors to design and supply the electronic guidance system for the interceptor.

► **Air Force evaluation of medium transport type aircraft including the Douglas Super DC-3, the Fairchild C-119 and Chase YC-123 to meet a Strategic Air Command requirement for a long-range air rescue transport has been completed and evaluated. Grumman SA-16, which took part in early tests, dropped out of the finals both of which were conducted at Eglin AFB, Fla. Results of the evaluation have been forwarded to AMC and the Pentagon and the winner will be announced shortly. Douglas is reported leading. The company has submitted twin proposals: 1. To convert existing C-47 equipment, and; 2. To build complete new aircraft.**

► N. A. Lougee, Inc., 44 Pine St., N. Y. has been awarded a $3,100,000 contract by Air Materiel Command to conduct a survey on how to expedite and speed up distribution of machine tools.

► **Army Air Research and Development Board members were stopped in their requirements tracks recently in connection with their insistence that USAF transport planes needed broader "footprints" to enable them to land in marginal fields. Aircraft engineers pointed out that planes such as the C-119 and C-47, etc., already had a broader footprint than most of Army's own ground trucks; that USAF planes could land and take off from fields too marginal to withstand the footprint weight of ground trucks needed to unload the planes. Army, embarrassed, checked and found the aircraft engineers right.**

► Bubble-canopy reinforcement strips seen for the first time on Republic Aviation's F-84G are of Fibreglas cemented to canopy glass as temporary expedient pending successful development of a stronger transparent covering than is now used. Air Materiel Command has requested such development because a number of present-type canopies have blown out on various jet fighters. The Fibreglas reinforced canopies have also been fitted on a group of F-84E fighters going to Europe under MDAP.

► **Army Ordnance has placed a contract with AC Spark Plug div., General Motors, Flint, Mich., for production of fire control systems of Army's new anti-aircraft gun "skysweeper". The system was developed by Sperry Gyroscope Corp., and consists of more than 20,000 parts and interrelated sub-assemblies. The company is already in heavy production on bombing navigational computers and gunsights for the Air Force.**

► Wright Aeronautical Corp. development program for Sapphire jet engines is reported to have brought this jet engine's thrust up considerably from basic 7,220-lb. thrust value. The engine uses no strategic metals in its hot end and continued development will be the basis of higher mass flow and "low" temperatures.

► **Navy and Marine Corps are considering development of a specially designed carrier-borne plane for paratroop operations. In the talk stage now, it is still uncertain whether the plane would be a new design for Navy attack plane up-dating the role of the Douglas AD, or whether it would first take the form of a modified Grumman Guardian. In either event, the plane would be capable of a primary role of ground support or delivering five or six parachute troopers and light chute-fitted equipment. On assault operations in Korea, it is pointed out, such a squadron could deliver an assault team anywhere behind enemy lines, then continue to provide air support while other planes shuttled more men to the airhead.**

Washington Roundup

"Emergency" Program: When?

That "emergency" program the Joint Chiefs of Staff blueprinted last December, after Chinese Communist thrusts in Korea alerted the U. S. to the prospect of a major war, probably won't move into full-swing before mid-September, at the earliest. The only money they have received since December is $6 billion to "carry on" through June.

The services aren't likely to get their $60-billion '52 fiscal year budget to implement it before December.

This is the outlook:

• It will be mid-August before the military budget clears its first step in Congress—the House Appropriations Subcommittee on the Armed Services. The subcommittee has spent four weeks hearing testimony on Army money requests, another four weeks on Navy testimony. It started off Air Force hearings last week. They will continue for another three weeks. After that, the subcommittee's chairman, Rep. George Mahon, expects: "It'll take us about three weeks to review and decide where cuts ought to be made."

• But the subcommittee's review might develop into a delaying fight. Members of the group want to carve "fat" out of the budget. The Republican leader on the subcommittee, Rep. John Taber, wants the whole military program cut back. Support for his position is growing, in pace with the shift from war talk to peace talk. Those who back Taber are concerned with over-stocking on ammunition, aircraft, and other military hardware.

• After it clears House Appropriations Committee, the military budget has six more steps in its course through Congress to the White House and enactment.

Between now and then—probably mid-September at the earliest—the services will carry on pretty much on a hand-to-mouth basis. This will be done under resolutions authorizing them to spend money at current levels from July 1, when the '52 fiscal year started, until the '52 budget is enacted.

But there won't be any flood of contracts to the industry until the services get their '52 fiscal year money—probably not for another two months.

150-Wing USAF

Air Force's plan to over-shoot the 95-wing program the Joint Chiefs of Staff approved with a 150-wing build-up is likely to have tougher going in Congress than in the Administration. Two developments point to this:

• Gen. Dwight Eisenhower, Commander, Allied Powers in Europe, reports that tactical aviation is the bottleneck in the Western European military build-up, a keystone of the administration's foreign policy program. Senators say he's having difficulty getting European countries to increase their armies—until the U. S. contributes tactical airpower for their support. Heavy emphasis in the 150-wing build-up is for tactical air.

• Air power's most vocal boosters on Capital Hill, a Republican faction led by Sen. Kenneth Wherry and Sen. Robert Taft, have whiffed this, and are souring on the big USAF program. They want a mighty strategic air arm—as the alternative to the Administration's plan for land forces supported by tactical air to protect friendly areas from Communist occupation.

Count on Wherry, a member of the Senate Appropriations Committee, to tackle USAF's Chief of Staff, Gen. Hoyt Vandenberg on USAF's "land approach" strategy when he appears to explain fiscal '52 estimates.

Keep the Nonskeds in Business

CAB will get a general directive from Congress to "keep the nonskeds in business" when Senate Small Business Committee issues its report. And senators who have conferred with members of the Board say they are confident CAB will keep the nonskeds in business.

The report will:

• Point out that nonskeds feel they must be allowed "14 or 15" trips monthly between major traffic points, instead of the three proposed in CAB's so-called "death-edict" order. But the committee won't urge this, nor any other specific course, on the Board.

• Urge that CAB consider licensing, and thus legalizing, nonskeds for route-type operations.

• Criticize the Board for being too paternalistic toward the trunklines and being too cautious of jeopardizing their position by injecting stimulating competition into the airline industry.

• Acknowledge CAB's accomplishment of transforming a shaky industry into a well-founded one since enactment of the 1938 Civil Aeronautics Act.

Fighters, Bombers Up

Air Force's "death sentence" for a government-financed program to develop new commercial cargo and transport protypes was a victory for USAF's military command over its civilian command.

In a statement to House Interstate and Foreign Commerce committee, USAF requested that action on the program be postponed. That means it's dead for this session of Congress—at least. Interested congressmen know there's no hope of getting House or Senate to vote funds for the program—unless air force gives it its blessing as vital to national defense.

USAF's Secretary Thomas Finletter and Undersecretary John McCone are strong proponents of the commercial prototype program. As members of the President's Air Policy Commission, they urged it December, '47.

But now they are supporting the military command's "fighter-bomber" complex and fear that stimulating commercial plane development would drain talent off strictly military projects. MATS commander, Gen. Laurence Kuter, has long but fruitlessly pleaded that commercial airlift in being is a vital national defense requisite.

USAF's Chief of Staff, Gen. Hoyt Vandenberg, calls it "desirable"—but not "essential".

Earmarking Airline Subsidies

Several members of Senate Appropriations Committee are getting impatient at the slow progress in separating mail pay from subsidies to air carriers. They are urging that the Appropriations Committee assign its own staff to do the job. The proposal will come to a showdown vote by the full committee soon. If Senate's Interstate and Foreign Commerce Committee, headed by Sen. Edwin Johnson, hasn't agreed on legislation making the separation by then, it's likely to carry. The appropriations group is solidly against CAB's plan to get $300,000 and another year's time to determine compensatory mail rates for all carriers (p. 56). —Katherine Johnsen

AVIATION WEEK

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UAL'S PATTERSON: Job insecurity led only to the top.

ALPA'S BEHNCKE: Faster planes put spectres before his eyes.

Strike Is Ended—But the Dispute Goes On

UAL pilots go back to work under truce, and talks resume on flight time issue.

Last week United Air Line pilots were again negotiating a new employment contract that would probably pace the rest of the big domestic airlines. They had returned to work after a ten-day strike. But the pilots were still refusing to fly the big, new Douglas DC-6B transports unless United would agree to reduce working hours on the plane in recognition of its greater complexity and productivity.

The Air Line Pilots Assn. has singled out United as the guinea pig in its drive for better working conditions. There's a possibility the pilots may strike again, but it would probably be after National Mediation Board had given up, and after the Korean situation had been settled. Then the airlines could not sell the President on the idea that a one-airline strike constituted something close to a miniature national emergency.

Only two basic pilot demands remain unsettled. These are:

- **Some limit on duty hours.**
- **Reduced flying hours** on faster planes.

But they are big ones—as important to all lines as to United.

▶**What the Pilots Want**—United has offered pay increases in place of hours limitations for both flight time and "on duty" non-flying time. But the pilots stick to their demands which apparently put working conditions ahead of take-home pay.

They say irregular high-tension hours away from home shorten the pilot's peak-health years of life—hence shorten his flying career. That's the basic fear driving them to ask shorter ground time as well as big-plane flight time.

Even the company offer of 75 hours ground time per month before overtime payment gives the pilot a full working month comparable to that of any office worker and much factory labor. If a pilot has 75 hours of duty on the ground and 85 hours in the air, that's 160 hours a month. In a 30-day month that comes to about 5 hours and 20 minutes a day for 30 days. Divide it up into working weeks. He works over 37 hours a week, just like the average man in any job. But his job is not average, pilots' representatives say. His mental and physical relaxation is vital to dependable, safe airline operation.

▶**Company Offer**—United's latest announced complete bid on pay and working conditions was June 1. Below is the company summary of that offer. But these are not averages that all pilots would get—they are what old-timers could make on an ideal schedule that was practical.

All rates are figured on 85 hours—the maximum flight time limit per month. All except DC-3 figure half day and half night time. DC-3 is 65 percent day and 35 percent night time. The average United captain earned $12,170 last year.

For standby reserve pilots, the company offers $800 a month guarantee for first pilots and $575 per month guarantee for co-pilots.

Guaranteed monthly pay for regular pilots is offered at the rate of 60 hours' flight time, flying half day half night time.

Ground-duty time in excess of 75 hours a month would rate 1½ times base pay of the pilot.

EXAMPLES OF UNITED PAY OFFER.

8-Year Captain:	Proposed	Present
Stratocruisers	$1,483	$1,381
DC-6s and DC-6Bs	1,304	1,238
DC-4s	1,157	1,116
DC-3s	966	945
5-Year Co-Pilot:		
Stratocruisers	$908	$570
DC-6s and DC-6Bs	802	570
DC-4s	721	570
DC-3s	606	570

▶**Pilots Ask**—The pilots want two things: some kind of limitation of ground duty and dead heading time; and less flying hours on faster equipment through a mileage limitation.

The pilot refusal to fly the DC-6B is not an extraneous issue. While the B is not appreciably faster than the DC-6

UAL-Pilot Dispute Record

August, 1949: Pilots tell United they want to negotiate a new employment agreement.

Sept. 27, 1949: Negotiations start, with pilots asking mileage limitation of flights per month, maximum ground and deadhead duty hours per month, pay increases, changes in guaranteed pay. Mileage limitation is one way of saying less flight time on bigger, faster, more complex planes.

April 21, 1950: Dispute goes to National Mediation Board, mediator is John F. Murray. Sessions go 34 straight days then occur twice more to Aug. 25. United offers pay increase averaging six percent.

Aug. 25, 1950: Mediator Murray proposes arbitration. Pilots accept but airline refuses.

Nov. 9, 1950: National Mediation Board closes file, relinquishing jurisdiction. Pilots and management continue intermittent negotiations into January, 1951.

Jan. 23, 1951: Spurred by Moral re-armament principles of absolute honesty on both sides, parties settle all but four of 13 major issues.

March 29, 1951: Pilots advise airline they have taken a strike vote. The four issues: ground duty time; hours of flight time on bigger faster planes; pilot pay; furlough pay.

April 23, 1951: Pilots refuse to fly the newer bigger DC-6B because they say their old contract does not cover it. Negotiations now include this fifth issue.

June 2, 1951: National Mediation Board proffers mediation.

June 15: Mediator Murray starts conducting negotiations with pilots and airline. Issues are narrowed to two: limitation of hours of total duty, and reduction of flight hours on newer, bigger, faster and more complex aircraft.

June 16: Pilots start "token picketing."

June 18: In continuing negotiations, pilots' union sets 10:30 am next day, June 19, for another meeting. But, at about 11:00, National Mediation Board receives pilot notice of intention to strike in morning.

June 19, 4:55 am CST: Pilots strike entire airline except for military charter and returning Korea veteran charters for leave. Air Line Pilots Assn. President David Behncke publicly backs strike. NMB Executive Secretary Thomas A. Bickers tells ALPA President Behncke men should return to work, as strike while in mediation is contrary to provisions of the Railway Labor Act.

June 23: President Truman asks pilots to return to work pending mediation.

June 23-28: Pilots offer truce on basis of pre-strike status quo—fly everything but the DC-6B. But airline says it will accept that only if DC-6B issue is negotiated first and exclusively, and the Bs are flying before other issues are taken up.

June 28: NMB Executive Secretary Bickers announces truce agreement: Pilots will go back to work on pre-strike status quo and the DC-6B will be first on the negotiations agenda.

June 29, 2:45 pm CST: United Air Lines flight schedule starts operation, ending a ten-day strike, except pilots still will not fly the DC-6B until agreement is reached on the big plane.

it is more productive and is a forerunner of much more productive ships to come.

The pilots rightly or wrongly have elected to make the B the symbol of future faster, larger, more complex equipment. They want to apply a productivity formula reducing pilot hours on the B, thus setting a precedent for all new equipment of the future. A DC-6B can fly, say, 300 mph. Jet transports will fly 600 mph. A concession on the slightly more productive B today will mean clear sailing on the much faster planes to come five years hence.

United Air Lines President William A. Patterson and Air Line Pilots Assn. President David L. Behncke have been doing most of the talking in the UAL-pilots dispute.

Both of them apparently believe this is the big ALPA-airline show-down that will decide where the pilot fits into the transport picture in the war-threatened and inflation-ridden 1950s.

In the most recent issue of the United Air Lines company magazine, Patterson answered an inquiry from a pilot on pilot job security by saying that he, Patterson, attained his present position because of job insecurity, not in spite of it.

In two years of argument with United, Behncke has emphasized pilot job security at every opportunity, hitching almost every issue to the spectre of technological unemployment.

► **Limit Outdated**—The pilots contend that the 85-hr. fatigue limit flight time maximum was set in 1933 on puddle-jumper airplanes. Labor's working conditions generally have gained tremendously since then. But pilot working hours are unchanged. And the pilot's job is infinitely more complex on the modern aircraft and requires more ground time and preparation.

The pilots have not spelled out exactly what they will settle for. That is natural labor bargaining procedure; they ask a limit of 17,550 miles per month, which equals about 70 hours flight time (fatigue limit) on faster equipment, compared with the present 85. But that is a bargaining demand; they may or may not end up winning some reduction from the 85-hours' flight time.

► **Ground Duty**—That brings up the pilots' other basic demand—a definite maximum number of hours on ground time. And they want a formula that gives flight time credit for ground time—something like 10 minutes flight credit for every 60 minutes ground time. Otherwise, every month the pilot is worried about getting enough flight time; bad luck can do him through the monthly schedule. The company refuses to accept such a formula. The company parries by offering some extra compensation for ground time over 75 hours a month.

But the pilots say they must have a definite maximum; otherwise their time is never their own, until they have been lucky enough to pile up 85 hours actual flight time that month.

Then there's the question of definition of what is pilot ground duty time. Pilots give this example: a pilot flying Chicago-New York and return has to wait five hours in New York before bringing his plane back to Chicago. His time is not his own, he cannot sleep or go far; he is on ground duty, says the pilot group. The pilots would define any wait of this sort less than eight hours as ground duty, not time off.

► **Strike Background**—Here is what lay behind the apparent futility of the 10-day United Air Lines strike, according to one observer.

Combination of heavy airline business and demand for pilots, at a time of airline pilot shortage, might have given the pilots a chance to score a clear-cut victory.

But the pilots had three things working against them: the President's national emergency powers granted after the Korean war broke out gave the airlines a chance to bring White House pressure to bear; the pilots and Air Line Pilots Assn. President David Behncke did not work together in planning the strike; and the strike occurred during government mediation procedures, a technical handicap if you need government understanding of your strike aims.

Some pilots say the United Air Line pilots' strike committee figured the

mediation could go on intermiably, once it started again. They were fed up with two years of negotiations, with Behncke at the helm. They struck.

Some dissension between the pilots and their leader may account for what appeared to be poorly planned strike tactics.

At the time the pilots struck Behncke himself was on the carpet with members of his own union office staff, who took their working condition problems to the National Labor Relations Board, demanding a union contract of their own, specifying pay, hours, and overtime.

So Behncke was not really prepared to run what might have been the most important strike and negotiations in airline pilots history. Right on the first day of the strike, the strike leader was busy defending his own union against charges of unfair labor practices.

AF Overhaul

Effect on policy seen following retirements and promotions.

The Air Force organizational structure has received a major overhaul with the announced retirement of four general officers, the transfer of 14 others, and the promotion of 37 officers. Eight moved up to the rank of lieutenant general, eight to the rank of major general, and 21 colonels were elevated to the rank of brigadier general.

These shifts in top level command structure, as forecast in AVIATION WEEK, June 18, will have a decided effect upon the present theory of employment of air force, one Pentagon source declared. Other assignments resulting from these top-level changes may be expected shortly, he said. An Air Force spokesman said that seven additional general officer reassignments were already in the mill and would become effective Sept. 1, but he declined to identify them.

► **Looming Battle**—Just what trend the "decided effect upon the present theory of employment of air force" will take is conjectural at this point. But a battle of strategic versus tactical air power is looming among Air Force policymakers, despite official disclaimers.

And cliques on Capitol Hill, as well as within the Air Force, subscribing to the competing doctrines are getting set to do battle.

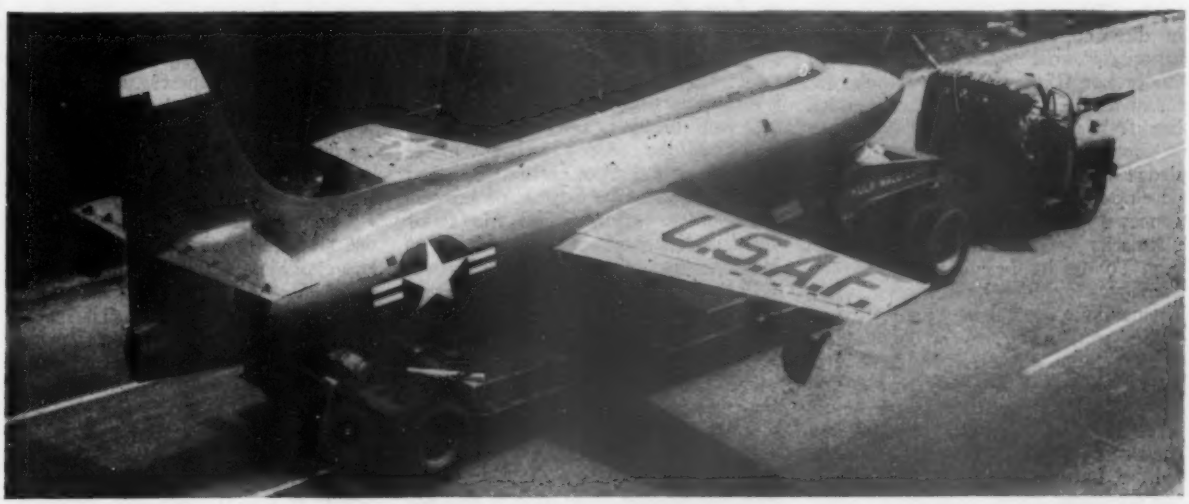
► **Three Stars**—Of the group of officers promoted to lieutenant general, five of the eight had held that rank previous to their announced promotion because of their duty assignments. These are Idwal Edwards, who has been deputy chief of staff, operations, and was named commandant, Air University; Earle E. Partridge, who has been acting commanding general, Air Research and Development Command and now has been promoted to commanding general, ARDC; Otto P. Weyland, acting commanding general, Far East Air Forces, and named commanding general, FEAF; Edwin W. Rawlings, deputy chief of staff, comptroller, named commanding general, Air Materiel Command; Benjamin W. Chidlaw, Air Materiel Command, named commanding general, Air Defense Command.

Three others promoted to rank of lieutenant general are: Thomas D. White, who moves from director of plans, deputy chief of staff, operations, to deputy chief of staff, operations; Orval R. Cook, who has been Director of Procurement and Industrial Planning, AMC, and has been named deputy chief of staff, materiel; and Charles B. Stone, who has been assistant deputy chief, materiel, and now becomes deputy chief of staff, comptroller.

► **Two Stars**—Promoted to the rank of major general are: Thomas H. Chapman, chief, maintenance division, AMC; Joseph V. DeP. Dillon, air provost marshal; John H. McCormick, director, military personnel; William M. Morgan, Western Air Procurement District; Raymond C. Maude, 1009th Special weapons Squadron; Frederick R. Dent, Wright Air Development Force; Julius K. Lacey, commanding general, Mather AFB; and William D. Eckert, comptroller, AMC.

► **One Star**—Colonels promoted to the rank of brigadier general are: George E. Price, Wilfred H. Hardy, Floyd B. Wood, Ernest K. Warburton, Walter W. Wise, Gordon A. Blake, Earl Maxwell, Donald B. Smith, Lee B. Washbourne, Joseph C. A. Denniston, E. Blair Garland, Matthew K. Diechelmann, William T. Hefley, John R. Golchrist, Thomas L. Bryan, Jr., Daniel C. Doubleday, Wiley D. Ganey, Henry K. Mooney, Clinton D. Vincent, Lloyd P. Hopwood, and William M. Gross.

Other general officers transferred to new assignments during the last 30 days are: Maj. Gen. Donald J. Putt, designated acting deputy chief of staff, development; Maj. Gen. Robert W. Burns, assistant deputy chief of staff,



FIRST VIEW OF BELL'S X-1A

Bell X-1A, en route from the factory to have its instrumentation installed at Cornell Aeronautical Laboratory, shows off changes made from the earlier X-1 geometry. Noteworthy are the increased fuselage length ahead of the wing, the complete new protruding canopy and dorsal spine, and the new hinging arrangements for elevators and ailerons. Plane carries four-cylinder rocket engine; fuel and oxidizer are fed by turbo-pump rather than by nitrogen pressurization. Design aim is increased endurance over X-1.

operations; Maj. Gen. Joseph Smith, director of plans, deputy chief of staff, operations; Maj. Gen. Robert M. Lee, deputy director of plans under General Smith.

Also, Brig. Gen. Mark E. Bradley, Jr., acting director of procurement and industrial planning, Air Materiel Command; Maj. Gen. Frank F. Everest, commanding general, 5th Air Force; Brig. Gen. James Briggs, deputy commanding general, 15th Air Force; Maj. Gen. Grandison Gardner, member of the Secretary of the Air Force personnel council; and Brig. Gen. James Ferguson, vice commander, 5th Air Force, FEAF.

General officers who retired June 30 are: Lt. Gen. Ennis C. Whitehead; Lt. Gen. K. B. Wolfe; Brig. Gen. William L. Ritchie, and Brig. Gen. Rosenham Beam.

► **Background of Battle**—There has been an almost continuous battle between bomber and fighter supporters for control of the Air Force ever since its first beginnings in the Signal Corps Aviation Section. Prestige of the promoters of high altitude employment of big bombers reached a peak during World War II in Europe and then suffered in the Pacific theater when high altitude bombing in many instances proved ineffective.

Outbreak of war in Korea and the subsequent employment of air power in that theater, has brought the present entire military concept of air power under Congressional scrutiny. Recent testimony on Capitol Hill by Maj. Gen. Emmett "Rosie" O'Donnell pointed up the interest Congress is paying to the air force concept when in answer to a direct question be declared: "There are no 'schisms' in the Air Force".

► **The Other Side**—This, of course, is in direct opposition to comments of other Air Force officers. Maj. Gen. Claire Lee Chennault (Ret.) spoke for many of them when he wrote in his book, "Way of a Fighter."

"Bombardment is, of course, the sledge hammer of air power. With the development of Gen. Billy Mitchell's concepts of strategic bombardment, popularity shifted from the fighter boys. . . . To the lumbering bombers, even then growing bigger and faster. . . . Tremendous technical and tactical strides were made in this field while fighters were almost completely neglected. It was this policy that forced Gen. H. H. Arnold to admit before West Point cadets in October, 1941, on the eve of Pearl Harbor, that 'frankly, fighters have been allowed to drift in the doldroms' ".

Speaking of lessons learned early in World War II, Chennault wrote: "All were calmly ignored by the bomber boys who controlled the development of the Air Corps at that time and were hell-bent for the Douhet (Italian Gen. Guilio Douhet) air force of bombers only.

"The same Air Corps officers who ignored these lessons were in control of the Air Force in 1942 and 1943 when hundreds of unprotected B-24s and B-17s were shot down over Europe. They are responsible for the deaths of thousands of American boys who had been indoctrinated with the absolutely false theory that a bomber needs no protection from hostile fighters. It is ironic that these officers have been covered with decorations for the achievements of an Air Force that they almost destroyed in its first years of combat."

Lockheed Wins

Design for turboprop freighter picked by AF in five-company contest.

Lockheed Aircraft Co. has been named the winner of the USAF competition for design of a four-engined turboprop-powered aerial freighter capable of moving a 25,000-lb. payload 2,500 mi. directly into a forward combat area.

The invitation to submit designs had been given to nine companies including Lockheed, Boeing, Douglas, Chase, Airlifts, Inc., Fairchild, Martin, North American, and Northrop, with the latter four declining.

Winning design, one of two submitted by Lockheed, is designated as Model L-206. Featuring a high-wing configuration, the plane is described by the company as having a "squat, highly ultilitarian fuselage with large aft cargo doors and an especially sturdy floor built 45 in. from the ground." The L-206 will be powered by four Allison T-38 turboprop engines developing 2,750 hp. each.

► **Joint Specs**—Criteria for the new design were mutually agreed upon by Air Force, Military Air Transport Service and the Army. Specifications required that plane must be capable of carrying a 25,000-lb. payload 2,500 mi. (about equal in distance from San Francisco to Hawaii); take off within 3,000 ft. over a 50 ft. obstacle using Rato; land within 3,500 ft. using brakes only; and have a treadway capable of supporting a 13,000-lb. single-axle load.

Specifications further required that the plane must be capable of 250-knot minimum speed and should be designed around turbo-prop power. In addition, Army required that the plane must feature two loading doors, one at the side and one at the rear. Requirements specified that the rear door must be operable for para-dropping equipment while the plane is in flight; that rear entry floor level be not more than 45 in. above ground level (truck-bed height) and that the plane be equipped for integral rear-ramp loading.

► **The Competitors**—Nine designs submitted by the five competing companies included five T-38 proposals; three alternate proposals using the Allison T-40; and one design proposing use of the Wright compounded R-3350 engine.

Douglas Aircraft submitted three proposals including the R-3350 engine; Chase Aircraft submitted three; Airlifts, Inc., submitted a scaled up Burnelli flying wing; Boeing submitted one design; and Lockheed, two. Gross weights of the designs entered ran from about 100,000 lb. for the Chase design to about 140,000 lb. for the heaviest of the Lockheed entries. Winning Lockheed proposal calls for a design gross weight of 109,000 lb.

Air Force spokesmen, while declining to describe the winning design in detail, said that it generally resembled the Chase XC-123 because of its high wing, broad-bellied fuselage and upswept tail to make rear loading possible.

Final decision is reported to have been a close race between a Douglas four-engine entry and the Lockheed design which won. It will be approximately two years before a prototype model of the Lockheed transport will be flown, an Air Force source declared.

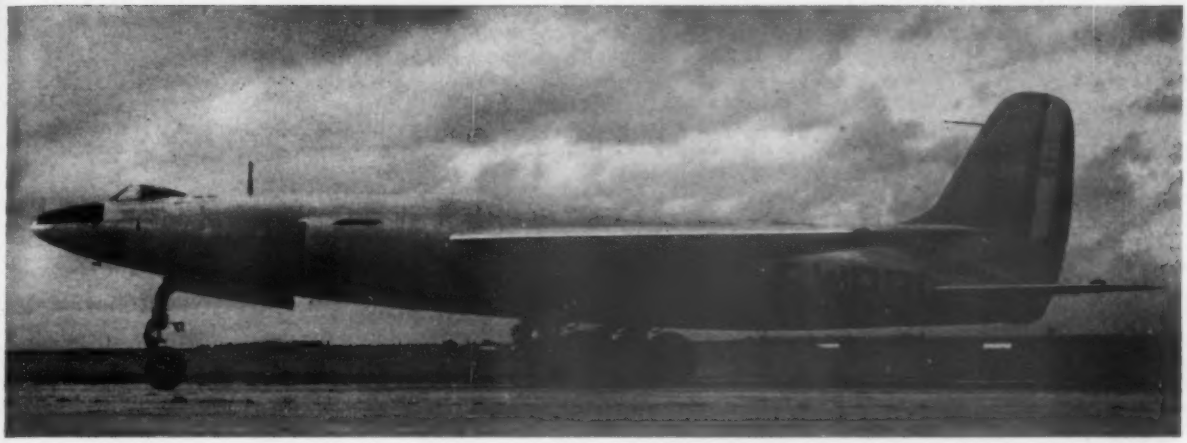
GE Sets Production On New Jet Engine

General Electric Co. will push output of its J-47-23 all-weather jet engine for one or more models of Boeing's B-47 Stratojet under a large-scale production program. Details of the -23 jet, which was announced last winter, were revealed in AVIATION WEEK, Dec. 4.

The jet's thrust rating has been upped to over 5,800 lb.—600 more than previously announced for the engine. It is believed that this is not the bare top power for this jet, for GE is just tacking on the additional thrust to the base level—"over 5,200 lb."—imposed by security originally.

Under the production schedule, GE will produce the engine at its Lynn and Everett, Mass., plants and also at its Lockland, Ohio, facility. Lockland will be the headquarters for the Gas Turbine division's executive, engineering and commercial staffs, now located in Boston. And as licensees, Packard will build the engine at Detroit, Studebaker at South Bend, Ind.

As part of its overall jet engine production, GE has taken on another facility to manufacture drop forge dies. This is the former Gaymont woolen mill in Ludlow, Vt., a three-story factory encompassing about 50,000 sq. ft. of manufacturing space, where work is scheduled to begin this month.



BEST OF BOMBERS designed since war in France is this twin-jet SO 4000, but France's trouble is production, not prototypes.

French Show: Many Designs, Few Planes

Good combat craft in prototype form, but lack of funds likely to prevent production of anything but transports.

By Ross Hazeltine
(*McGraw-Hill World News*)

Paris—The French aviation industry put on a show at the Nineteenth International Air Salon in Paris that showed what France can contribute to the air defense of the West, and proved that plane building in France is an undernourished infant industry—but an interestingly precocious tot.

The four big nationalized aircraft companies and the 19 smaller private plane builders together employ only about 38,000. They have produced a number of interesting design features, but are just approaching the point where they can begin to supply a part of France's military aircraft needs.

▶ **Prototypes Only**—Many of the postwar French-designed military planes still exist only as prototypes. The industry will have to be fed a much richer diet of military orders before it can gird itself for quantity production.

Security regulations prevented exhibiting some of the latest military prototypes in the big glass-domed Grand Palace on the Champs Elysees or at the flying demonstration at Le Bourget Airfield. But from available information it is clear that the French designs generally are not so far advanced as comparable American and British planes.

Unless military censors have wrapped the fact in tightest secrecy, France has yet to build her first supersonic plane. The French Air Force will have to lean heavily for several years to come on the British Vampire fighter, produced in France under license in a slightly modified version called the Mistral, and on shipments of U. S. military aircraft.

▶ **Fighters**—Probably the best of three outstanding French fighters is Marcel Dassault's Ouragan, MD 450. It is the only French-designed fighter in production. The Air Ministry has ordered 150.

• **The Ouragan** is powered by a Hispano Suiza Nene turbojet with a thrust of 5,000 lb. Its maximum speed is about 600 mph., and its ceiling is 49,000 ft. Dimensions: span, 38 ft. 7 in.; length, 34 ft. 9 in.; height, 13 ft.; total weight loaded, 11,684 lb.

• **The MD 452 Mystere**, an improved version of the Ouragan, made its first flight on Feb. 23, 1951. The Mystere is an all-metal, cantilever lowwing monoplane like the Ouragan. But its wings are sharply swept back, and it is reported officially to have attained a speed of more than 650 mph. It is still being tested.

The two other jet fighters under test are the SO 6021 Espadon and the SE 2410 Grognard. Prototypes of both have been produced in several versions.

• **The SO 6021** is a single-seat, all-metal midwing monoplane powered by a Hispano Nene turbojet. It has swept back wings with slotted flaps and is reported to have flown 625 mph. Dimensions: span, 34 ft. 9 in.; length, 49 ft. 2 in.; weight loaded, 15,115 lb. Its service ceiling is 42,650 ft.

• **The SO 6025 and SO 6026** are improved versions of the SO 6021. Both are equipped with a rocket engine to provide additional power and are reported to have shown considerably improvement over the latter in rate of climb and in maximum speed.

• **The SE 2410** is a single-seat fighter powered by two Hispano Nene engines, mounted one above the other to reduce the width of the fuselage, and fed by a large air intake just behind the cockpit. It made its first flight Apr. 30, 1950, and is reported to have attained a maximum speed of 596 mph. Its wings are swept back 32 deg.

• **The SE 2415 Grognard II** flew for the first time on Apr. 14, 1951. This later version is a two seater with the nose of the plane lengthened to house a radar installation and the second seat. Its wings are swept back slightly less. Dimensions: span, 50 ft. 7 in.; length, 54 ft. 9 in.; weight loaded, 36,116 lb.

▶ **Bombers**—The best of France's new bomber designs is the SO 4000, an experimental jet bomber that made its first flight on Mar. 16, 1951. Its wings are swept back 31 deg. and equipped with Fowler-type flaps. It is a two-seater and is powered by two Hispano Nene engines with a total thrust of 10,000 lb.

The SO 4000 can carry 1,430 gallons of fuel. Its landing gear consists of a steerable nose wheel and two sets of main wheels with independent legs retractable into the wings. Dimensions: span, 58 ft. 7 in.; length, 64 ft. 10 in.; weight loaded, 48,510 lb.

The Air Ministry also is testing three carrier-based planes, the Breguet 960 Vultur, the Nord 2200 and the Arsenal VG-90.

• **The Breguet 960** will carry two power plants—a turboprop with a four-blade airscrew, and a Hispano Nene turbojet. Powered by the turboprop only the plane will be able to cruise for more than three hours at a speed of 248 mph. With the turbojet on, it can accelerate to over 545 mph. for about one hour. Two prototypes of this plane are under construction. Dimensions: span, 54 ft. 3 in.; span with wings folded 24 ft.

2 in.; length, 43 ft. 4 in.; height, 16 ft. 8 in.; weight loaded, 22,204 lb,; ceiling, 42,650 ft.

• **The Nord 2200** is a low-wing monoplane powered by a Hispano Nene turbojet. Its maximum speed is 593 mph., and its deck landing speed is 96 mph. It has very thin sweptback wings equipped with Fowler flaps. Dimensions: span, 39 ft.; length, 44 ft.; height, 15 ft.; weight loaded, 17,378 lb.

• **The Arsenal VG-90** is designed to carry two 1,100-lb. bombs and eight rockets on short-range missions. Its maximum speed is 562 mph., and it lands at 100 mph. It is powered by a Hispano Nene turbojet. Dimensions: span, 40 ft. 11 in.; length, 42 ft. 2 in.; height, 9 ft. 1 in.; weight loaded, 17,600 lbs.; ceiling, 42,650 ft.

▶ **Future Prospects**—These are the best of the postwar crop of French combat aircraft. But to date only the Ouragan is in production, and French builders fear most of the others will never reach the production line. To get into production will cost a lot of money—possibly more than the French government will be willing or able to advance.

So the prospects are that France will be forced to depend largely on shipments of fighting planes from America and devote her own aircraft industry to production of transports—a project already underway—and of less expensive, lighter types of aircraft.

Gen. O'Donnell Denies AF Factional Fight

Fifteenth Air Force's Commanding Gen. Emmett O'Donnell wrote off reports of a growing "schism" between tactical and strategic air factions in the Air Force as completely without basis in his testimony before the Joint Senate Foreign Relations-Armed Service Committee winding up its investigation of the dismissal of Gen. Douglas MacArthur.

Stating that he is not aligned with "any minority group," O'Donnell, a strategic air expert, volunteered: "I want to assure you that such could not be further from the case. Gen. (Hoyt) Vandenberg is our chief and we are all shoulder to shoulder, squarely behind him, pushing with all our power to overcome the very grave difficulties we face." O'Donnell was in command of the Far East Bomber Command from July 8 of last year to Jan. 10, during the time retaining command of the 15th Air Force.

▶ **Monday Quarterback**—The USAF general said that the Korean aggression might have been checked in its early stages simply by an ultimatum to North Korea, followed by an unleashing of American air and naval power.

He said: "It might come under the head of Monday morning quarter-backing, but it is an interesting speculation to think what might have happened had you never put an American ground soldier in Korea. . . . There is no question in my mind I could have gone out there with the Air Force I had and done that type of job within three months. . . . You would not have had all the devastation and tremendous expense."

But O'Donnell questioned the wiseness of the MacArthur proposal to bomb Manchurian bases at this time, in view of the stepped-up air activity in the theater. The better course, he suggested, might be to concentrate on the USAF build-up now underway, conserving our Air Force for "a Sunday punch" on Russia instead of having it nibbled away in the Far East.

Other points made by O'Donnell:

• "Small as the Strategic Air Command is today, it can deliver the most horribly destructive single blow that the world has ever seen from one unit . . ."

• Using big bombers, as they were in Korea, to hit culverts is like using a shotgun to kill a flea. "In future they should be utilized by one command, the command that has studied their utilization and knows everything about it and they should not be given out piecemeal to theaters where they might be used improperly. I think they might be sent against unworthy targets."

• "The main protection available to the long-range strategic bomber is speed and the ability to fly in all types of weather and at night."

• "No American air attack has ever been stopped by an enemy action and we don't believe it ever will be. . . ."

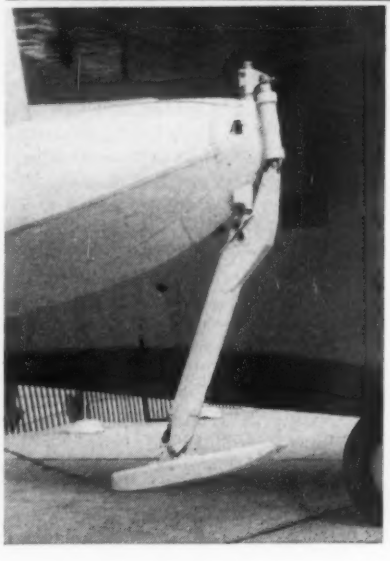
• "It is against the national interest for us in the U. S. to become involved in large-scale ground wars in either Asia or Europe."

• "It took only 11 days from the time bombers were first ordered to Korea last year to get them into actual operation against the enemy."

• "Very definitely" Communist air crews fighting in Korea are sent to Russia to train Communist pilots in the latest methods of fighting American aircraft.

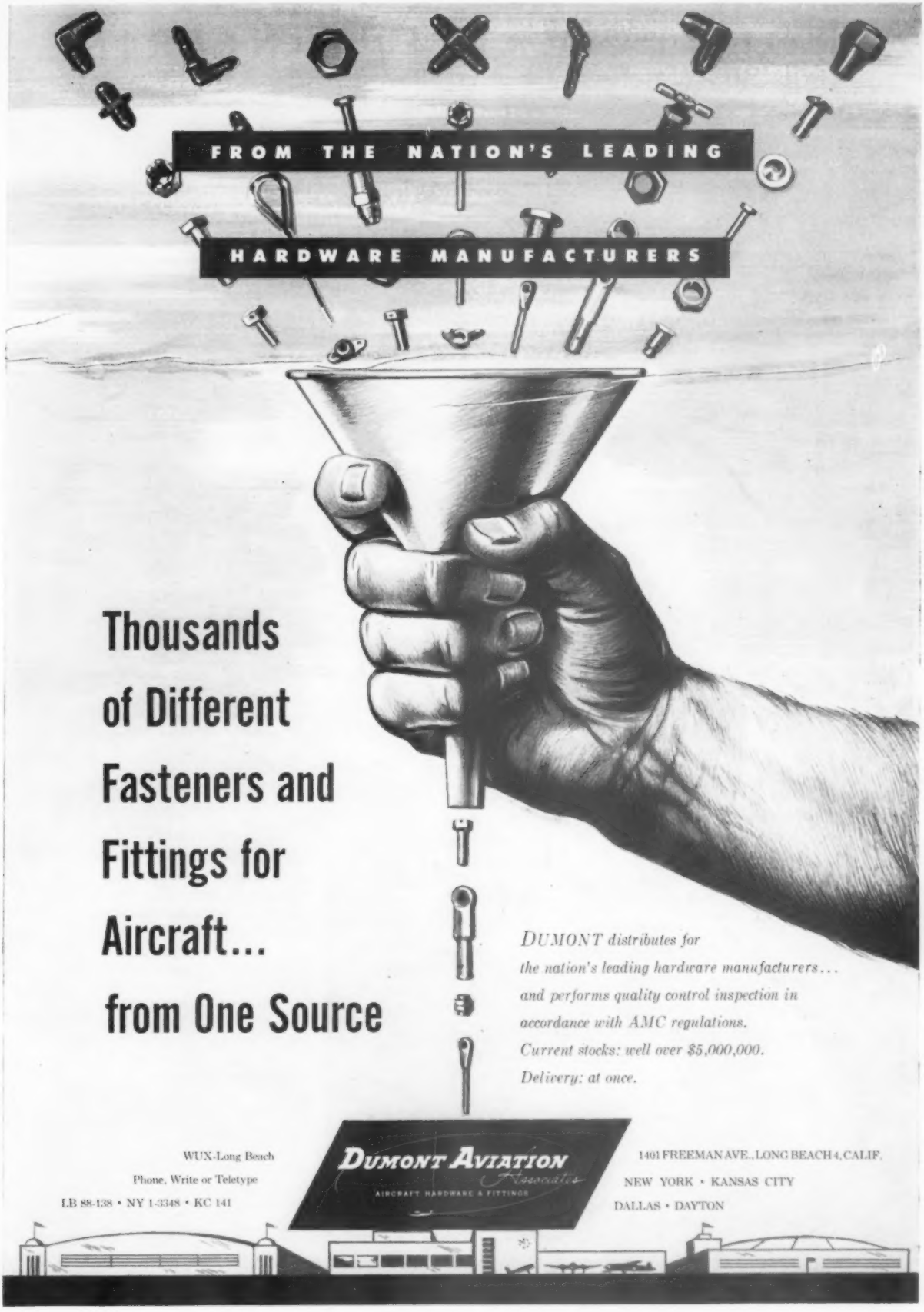
B-36F Delivered

First production Convair B-36Fs have been delivered to USAF and are undergoing accelerated service testing at Carswell AFB. The B-36F has newer P&W R-4360-53 engines incorporating more than 25 improvements



SA-16 ARCTIC FOOTGEAR

USAF Grumman SA-16A Albatross air-rescue plane has been fitted with this novel articulated ski gear for Arctic operations. The installation, which weighs about 600 lb., comprises a main ski fitted beneath the plane's keel (above, arrow) and auxiliary skis mounted on the nose of each wingtip float (left). Skis are not retractable, have air-hydraulic oleos to absorb shock on touchdown. This installation is the first such on the SA-16A, and is slated to go on production planes beginning in October. It is not yet decided whether it will also go on Albatrosses already in service. Air-Rescue Service suggested the modification, specifications were drawn up by the Air Materiel Command, and the units designed and built by Grumman. The gear has been field-tested in Alaska. Another modification on the SA-16 has been the transfer of the radome from beneath the port wing to the nose.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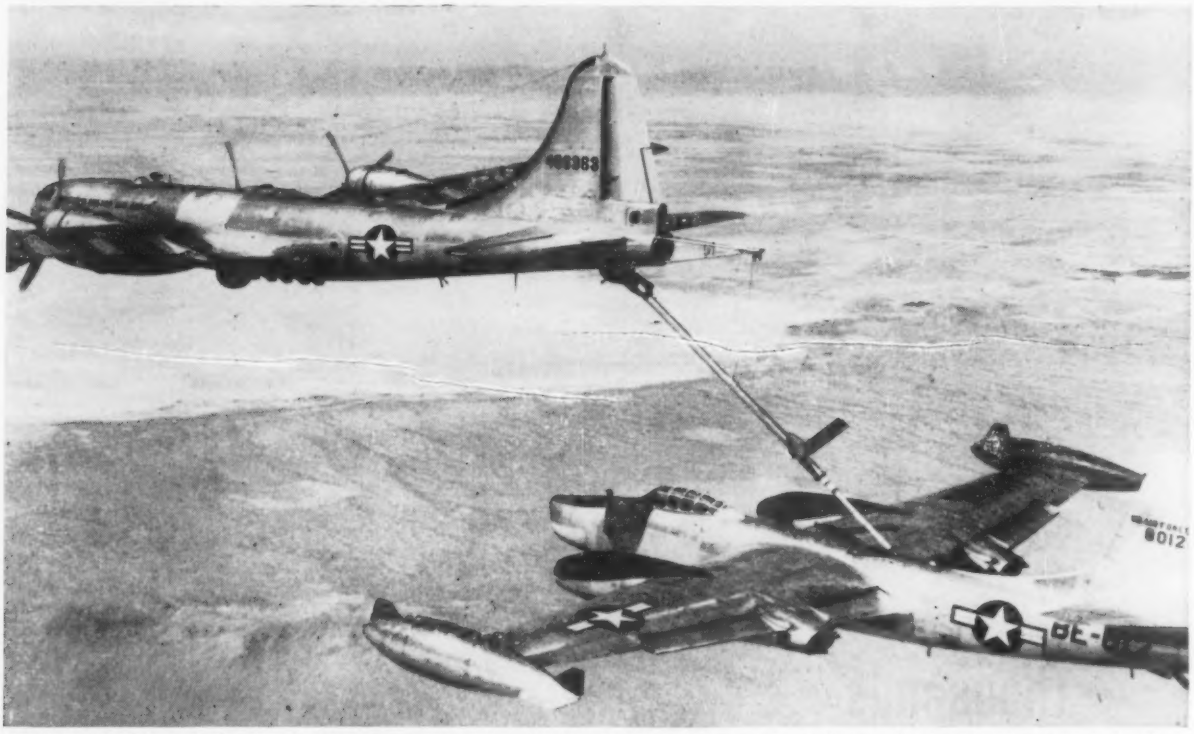
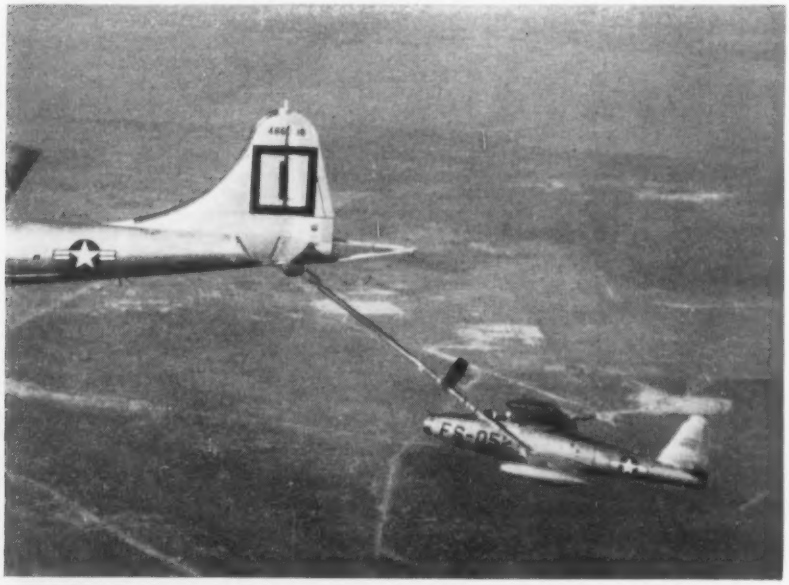


NORTH AMERICAN RB-45C four-jet reconnaissance bomber has its air fueling port located atop the fuselage forward of the fin.

Mid-Air Refueling Designed For Use With Many Planes



REPUBLIC F-84E, air-refuelable prototype of F-84G, gets gassed up at wing leading edge.

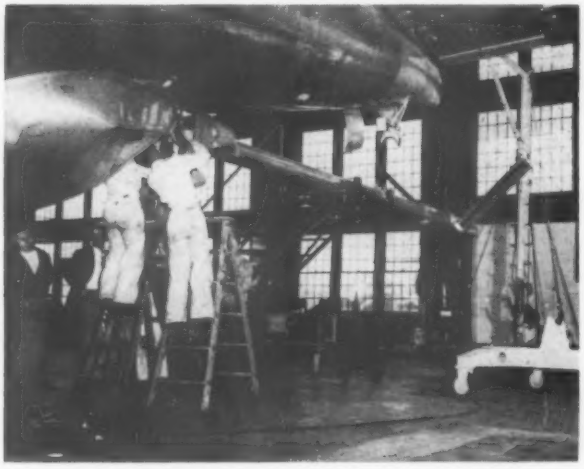
Mid-air refueling equipment is rapidly becoming standard on many of the USAF's latest jet aircraft to offset the turbojet's biggest handicap, its high fuel consumption which seriously cuts into a prime military plane need—duration or range.

Boeing Aircraft Co., which has refined the British-developed probe-and-drogue system into its own Flying Boom configuration, is studying application of the method to commercial transports. Since aircraft can carry greater loads in flight than they can get off the ground, aerial refueling offers great potentials for more efficient and profitable use of airliners.

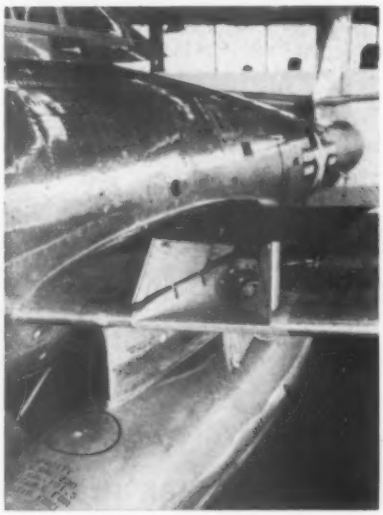
These potentials will now receive much practical demonstration, because of their pronounced military value. The considerable strides the USAF has made with this technique for use with its bomber and fighter aircraft is shown in the pictures on these pages. Also mentioned as being fitted with in-flight fueling equipment are the North American F-86 Sabre and the Lockheed F-94C.

Boeing is building additional C-97 Stratofreighters for the USAF which are quickly convertible for use as either tankers or cargo planes. The planes will leave the factory as tankers, but will carry complete transport conversion kits, including seats, cargo doors and ramps.

BOEING B-47 six-jet bomber has nose port for taking Flying Boom "piloted" into place by operator in KC-97A tanker pod (right).



REFUELING OPERATOR'S POD is engineered as a complete package permitting installation on Stratofreighter in about 6 hr.



REPUBLIC F-84E, (above) one of the two Thunderjets that flew the Atlantic non-stop using mid-air refueling, has British probe on port wing. Much cleaner, submerged installation for use with Flying Boom is standard equipment on new F-84G (right).

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NACA Reports

▶ Two-Dimensional Subsonic Compressible Flows Past Arbitrary Bodies by the Variational Method (TN 2326)—by Chi-Teh Wang, New York University.

Two-dimensional compressible flow can only be described by a complex nonlinear differential equation. With the exception of a few simple cases, the exact solution of that differential equation is still unknown.

The variational method of solution is an attempt to eliminate the need for solving the nonlinear equation. In this method, a variational integral is formulated and then approximate solutions are developed from the Rayleigh-Ritz procedure.

This method can be used to study the flow without linearization, and the computation can be done without any mathematical difficulty. The solution is of high accuracy.

There is a further advantage to the variational method in that it may be used to calculate directly the flow passing a given airfoil at different Mach numbers.

Two numerical examples are developed in the Tech Note, and show that the variational method gives excellent agreement with results obtained from other methods.

The results further indicate that the method may be used to give good approximations to the solutions for both thick and thin bodies at low and high subsonic Mach numbers.

The study was carried out at the Daniel Guggenheim School of Aeronautics, College of Engineering, New York University, under the sponsorship and with the financial assistance of the NACA. —DAA

▶ Supersonic Lift and Pitching Moment of Thin Sweptback Tapered Wings Produced by Constant Vertical Acceleration—Subsonic Leading Edges and Supersonic Trailing Edges (TN 2315)—by Frank S. Malvestuto, Jr. and Dorothy M. Hoover.

This analysis is the application of a published solution of the linearized time-dependent wave equation for wings in accelerated motion. The results of the analysis are independent of camber and thickness. They are applicable for the range of supersonic speeds defined when the wing is wholly contained between the Mach cones originating from the wing apex and from the trailing edge of the root section (subsonic leading edge and supersonic trailing edge).

Design curves are presented which can be used for rapid estimation of the

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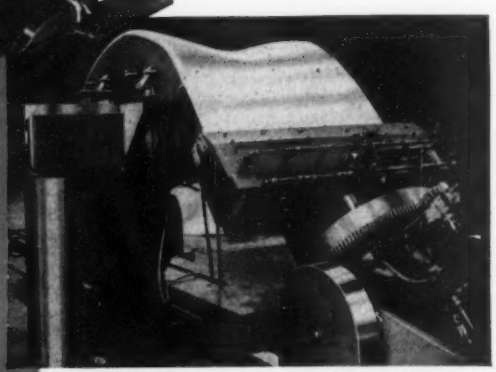

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derivatives of $C_{l\alpha}$ and $C_{m\alpha}$, for given values of aspect ratio, taper ratio, Mach number and leading-edge sweep.—DAA

► **Transient Aerodynamic Behavior of an Airfoil Due to Different Arbitrary Modes of Nonstationary Motions in a Supersonic Flow (TN 2333)—by Chieh-Chien Chang, Johns Hopkins University.**

This treatment is an extension of the author's earlier work which was published in the Journal of the Aeronautical Sciences, November, 1948.

If the aerodynamic response of the airfoil to a step-function disturbance is known, then the aerodynamic effect of any arbitrary motion of the airfoil can be determined by the method of this note.

A new function has been introduced by the author to carry out the investigation. It is sufficiently fundamental to the supersonic flutter problem that the behavior of all the different degrees of freedom can be expressed in terms of this new function and the usual transcendental function.

The work was sponsored and financed by the NACA.—DAA

► **Fatigue Strengths of Aircraft Materials—Axial-Load Fatigue Tests on Unnotched Sheet Specimens of 24S-T3 and 75S-T6 Aluminum Alloys and of SAE 4130 Steel (TN 2324)—by H. J. Grover, S. M. Bishop and L. R. Jackson (Battelle Memorial Institute).**

Each of these metals, commonly used in aircraft construction, has been tested in one thickness (0.090 in. for aluminum alloys and 0.075 in. for steel) and all tests were conducted under axial loading.

These studies were initiated after a wartime survey showed a lack of complete information on fatigue properties of sheet materials common in airframe construction. The survey made it apparent that no material had been investigated fully, and that no strictly comparative tests of large extent had been made on different materials under controlled conditions.

Batelle personnel conducted the investigation under sponsorship and with financial aid from the NACA.—DAA

► **High-Temperature Protection of a Titanium-Carbide Ceramal with a Ceramic-Metal Coating Having a High Chromium Content (TN 2329)—by Dwight G. Moore, Stanley G. Benner and William N. Harrison, National Bureau of Standards.**

One material with excellent physical properties at elevated temperatures is a cobalt-bonded, titanium-carbide ceramal designated as K-138 by its manufacturers, Kennametal, Inc. However, the material has a potential weakness

in that a progressive oxide formation occurs on prolonged heating of K-138.

NBS has developed a coating for the material which retards the oxidation progress. This coating was designated as A-479M and contained 80 percent by weight of chromium powder and 20 percent of an alkali-free grit (glass). The coating was applied either by dipping or by spraying.

After drying, it was bonded to the ceramal by firing at 2200F for 10 min. in a purified hydrogen atmosphere.

Tests made on the finished sample indicated that the A-479M coating would greatly prolong the life of the K-138 sample (made into a turbine blade) at 1800F. These tests were severe enough to accelerate failure of the uncoated blade by oxide formation.

The investigation was sponsored and financially supported by NACA at the NBS. —DAA

▶ Wind-Tunnel Investigation of a Number of Total-Pressure Tubes at High Angles of Attack—Subsonic Speeds (TN 2331)—by William Gracey, William Letko and Walter R. Russell.

This note reports on one phase of a program underway at the NACA to determine the possibility of designing a fixed total-pressure tube. The tube is intended to be insensitive to inclination of the air stream over a wide range of angle of attack, throughout the subsonic and supersonic speed range.

The investigation reported here was of 39 different tubes; they were tested over an angle-of-attack range of ±45 deg. and at an indicated airspeed of 195 mph.

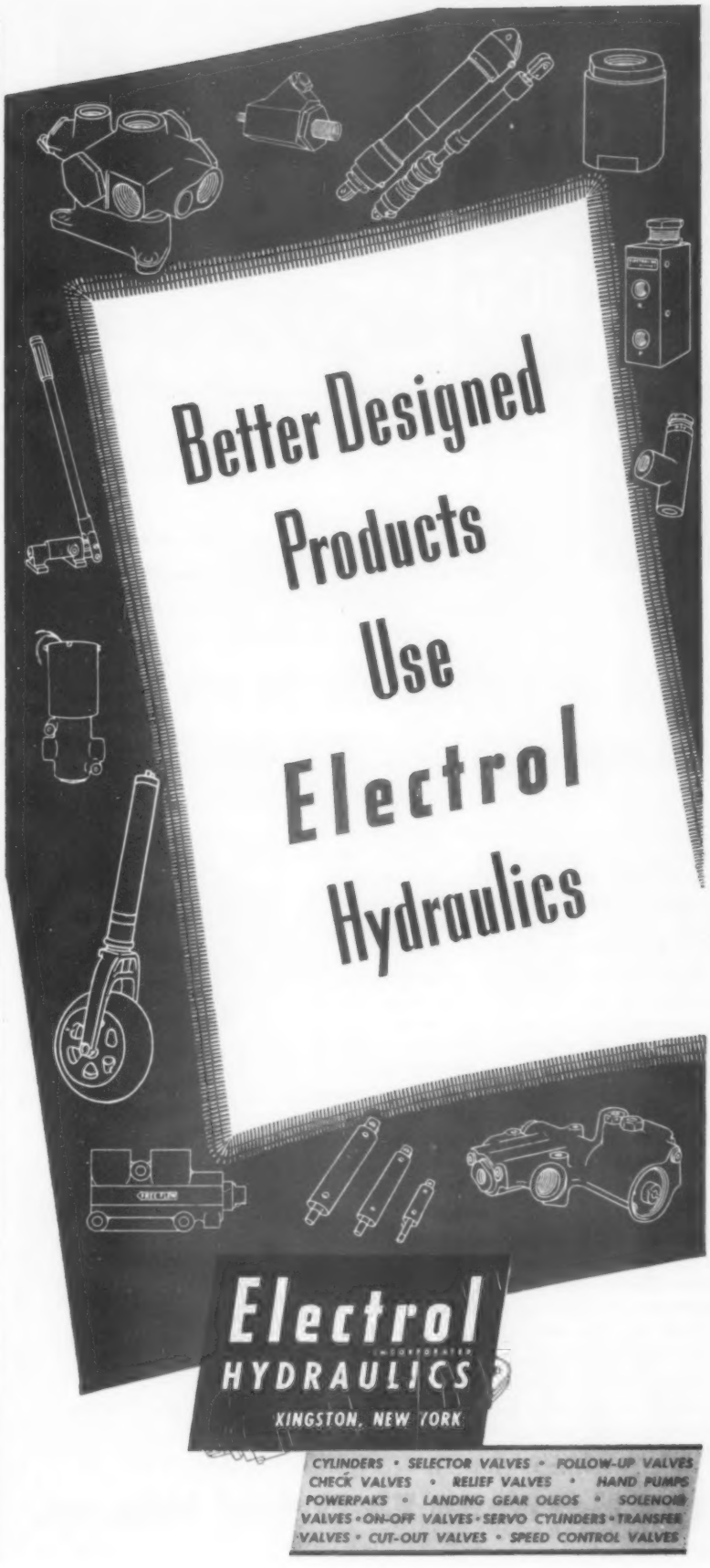
Results showed that the least sensitive tube was a shielded Kiel type. This tube was designed for end-mounting on a horizontal boom and had a vent area equal to 1.5 times the entrance area. The tube remained insensitive to within one percent of the impact error over an angle-of-attack range of ±41.5 deg. —DAA

▶ A General Through-Flow Theory of Fluid Flow with Subsonic or Supersonic Velocity in Turbomachines of Arbitrary Hub and Casing Shapes (TN 2302)—by Chung-Hua Wu.

This theory was derived primarily for turbomachines having thin blades of high solidity.

Continuity equation and the equation of motion in the radial direction are combined through the use of the stream function to form a principal equation for the problem. Two forms are obtained; in one, the variation of tangential velocity must be known, and in the other, the variation of the ratio of tangential to axial velocity must be known.

General method of solution is out-



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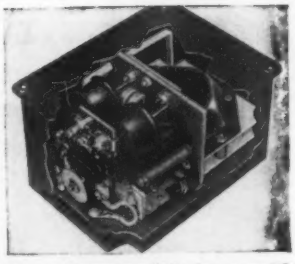
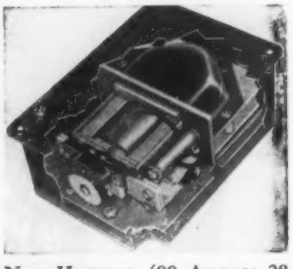


New Hartman 400-Ampere 28 Volt Reverse Current Cutout (A-750D)



New Hartman 400-Ampere 28 Volt Contactor for aircraft with panelized systems (A-751D)

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lined, but specific examples of the application of the theory are discussed. These latter include common types of compressor and turbine using free-vortex, symmetrical-velocity-diagram, solid-rotation, non-twisted blade, and radial-blade-element designs. A correction factor for blade-thickness effect is suggested. —DAA

Are English Civil Jets in the Race?

(*McGraw-Hill World News*)

Melbourne—Is Britain's head start in the development of jet-powered civil air transport planes threatening to sweep America's conventional airliners from the skyways of the British Commonwealth?

Seen from Australia, it looked like it a year ago. Australian domestic and international airlines were holding back replacement orders for American planes because British and Canadian aircraft companies were reportedly promising delivery of jet transports within a year.

But at this time, when some of the jets were already to be in commission, Australia's leading operators are still talking piston aircraft. They are less worried about the impact of jet transport on flight management than they were a year ago. Their real worry is how to get American DC-4s and Convairs to replace older types still in service.

▶**No Jets Available**—Australian National Airways executives recently shopping in English aircraft plants were surprised to find that jet transports were not available anywhere for immediate delivery. Even the much-vaunted de Havilland Comet was still undergoing tests. Vickers and Handley Page wouldn't even guess when Viscount and Hermes V turboprops would be for sale in numbers.

The ANA men returned to Australia with the knowledge that jets are "out" for at least two years. Another pointer they brought back from Britain is that jets wouldn't be an economic proposition on any but the longest Australian routes and on international services.

One of tomorrow's English aircraft on which Australian operators are keeping a watchful eye is the Airspeed Ambassador, a 40-seater. It is powered with a Bristol Centaurus piston engine, but is so designed that a jet engine can be fitted in its place when required.

It is true that British plane builders are showing more than usual interest in the Australian market, which is starved for aircraft by years of dollar restrictions and of uncertainty about the future of piston aircraft. At least three aircraft salesmen arrived from Britain within the last few weeks. But all they could

promise is piston aircraft at a not too near date.

▶ **Second-Hand Market**—By and large, when thinking of replacements Australian operators are still thinking in terms of American planes, as no English maker seems to be able to sign up for immediate delivery. The fear that American airliners may be harder to get as the rearmament effort gathers strength has precipitated a kind of replacement panic. But the government continues to bar the most direct escape with unmitigated restrictions on dollar expenditure. On the other hand, the second-hand market for DC-4s and Convairs in the sterling area has almost dried up.

The few postwar passenger transports which Australia has are being worked to the limit. DC-4s are averaging 4,200 flight hours a year and Convairs do 3,000.

It is therefore no wonder that Australian airlines are eagerly snapping up almost any modern second-hand plane that can still be got for sterling. Trans Australia Airlines is having a Skymaster fitted in England. Qantas Empire Airways has bought a second Constellation, its sixth, from Air India International.

Non-Aero Engineers Fitted for New Job

The critical engineering shortage in the aircraft industry is being eased somewhat through a conversion training program for fitting non-aeronautical engineers and technicians into aviation work.

After the first six months of a transition program at Republic Aviation Corp., 242 trainees—only a few having aeronautical experience—have been placed in the company's aerodynamics, stress, weights, flight test, research and drafting departments. Those who entered drafting training included civil, mechanical and electrical engineers, architects, holders of bachelor of science and miscellaneous degrees and trade school certificates, and others with some college training.

Many of the trainees were put to work before the six-week course was completed, and several have received promotions, indicating an easy adaptability.

C-W Rocket Motor Gets Throttle Control

Curtiss-Wright's Propeller division's rocket motor for the Bell X-2 high-speed research plane will have throttling control—perhaps down to as low as 25 percent of full thrust.

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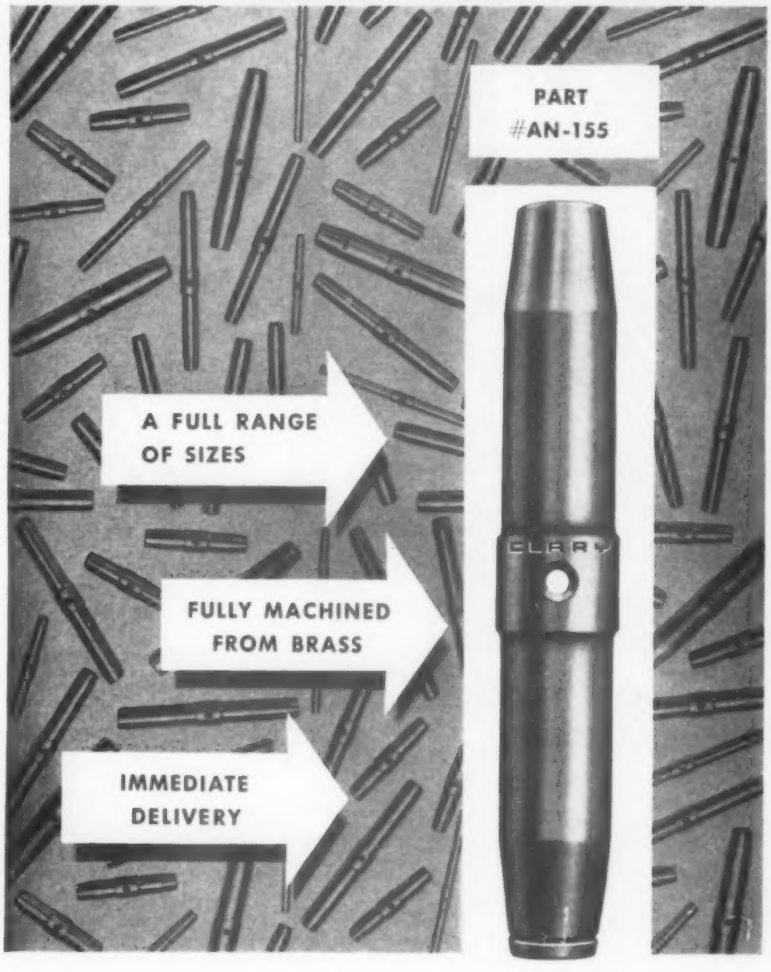

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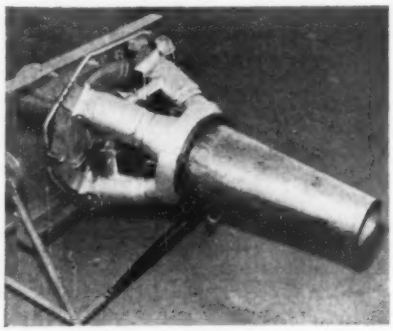
in itself. And if C-W has accomplished this in a manner comparable to the simple conventional control on piston engines and jets, it will do much to promote the use of rocket motors as standard powerplants in specific types of military planes.

There has been considerable speculation in aviation circles as to why C-W hasn't already delivered the motor for installation in the X-2.

One hunch, along with others tossed about, is that because the project is foreign to the Propeller division's normal design and development activities, its progress has been delayed. But this slant probably is invalid, because the organization isn't lacking in technical ability for a rocket project.

Rocket development, considering where it still has to go, is yet in its swaddling clothes. And the company could overcome its lack of prior experience in the field by attempting a new approach, unhampered by the usual "do's" and "dont's."

That this new approach has been taken is emphatically evidenced by the inclusion of throttling control in the rocket motor—and probably establishes the reason for any slowup in the completion timetable.



Aero Students Build Baby Jet

A small, lightweight jet engine, reported capable of powering a plane the size of the Navion for a 200-300-mph. speed range, has been developed by engineering students at Northrop Aeronautical Institute, Hawthorne, Calif.

The power unit is a four-burner configuration incorporating a modified supercharger from a Lockheed P-38. It weighs 168 lb. and is estimated to have a potential of 320-lb. static thrust.

The engine incorporates a speed-control governor to stabilize rpm. at any desired setting. The governor regulator, by relieving excess fuel pressure at the desired rpm. setting will tend to maintain a constant speed and correct fuel/air ratio.

The engine is now undergoing tests as a demonstrator at Northrop Aeronautical Institute.

A section of the drafting room . . . International Business Machines Corporation, Endicott, New York

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2. Blueprints can be reproduced directly. These prints are used to exchange design information between IBM's plants in Endicott and Poughkeepsie, N. Y. Whenever extra copies are needed for the shop—in either plant—there's no problem: Autopositives are made from the prints . . . and from these intermediates the required number of shop-prints are produced at uniform, practical machine speeds.

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5. Halftones are copied. When limited runs are sufficient, IBM uses Autopositive Film to reproduce halftones and other printed illustrations in its instruction handbooks. This high-contrast material holds the finest line . . . keeps close lines from filling in. As a result, the direct-process prints produced from these intermediates are amazingly sharp.

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MID-CONTINENT OKAYS JANITROL FOR ENTIRE CONVAIR FLEET

Now is a good time to install Janitrol heating equipment in Convairs, and count on the same performance—"equal to all occasions"—that Mid-Continent obtained last winter. Capt. L. Homer Mouden, one of Mid-Continent's pilots, wrote in his log book: "It is really a comfort and a joy to have heat in the cockpit. This is the best arrangement of our CV-240 fleet . . . and thanks from the pilots." "Thanks to you, Mid-Continent, for this heart-warming testimonial . . . Your nearest Janitrol representative can furnish prompt assistance in planning and making this installation.

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December 27, 1950

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Since completing the installations in our fleet of Convairs, we have operated in temperatures far below zero, both on the ground and in the air, and have found the Janitrols equal to all occasions. Our Convair cockpits are warm and cabins may be heated to a comfortable temperature before boarding passengers, regardless of outside air temperatures.

In fact, the Janitrols can serve a third purpose in that there is sufficient heat available for both the cabin and cockpit, making it possible to use all heat from the normal source for anti-icing, should such action be desirable.

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Engineering and Maintenance

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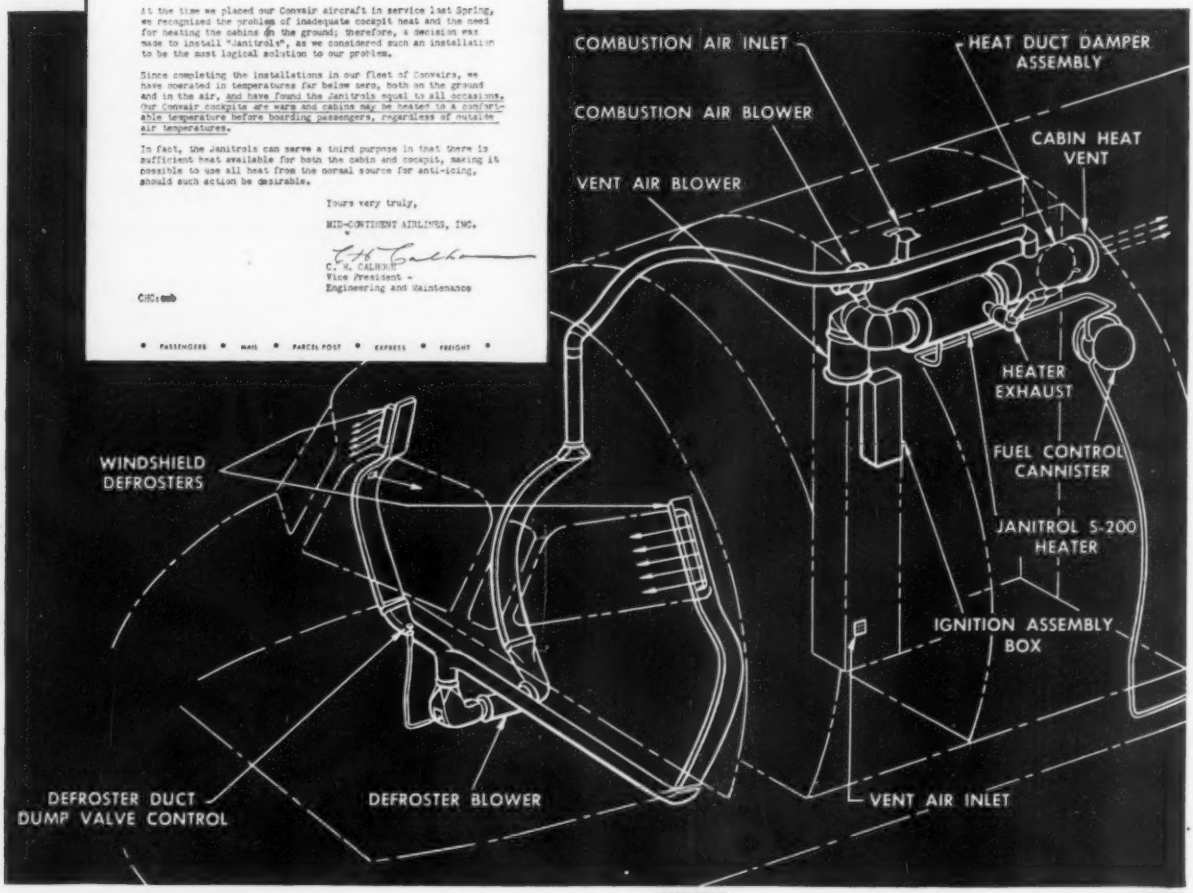

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Navy Jet Lab Gets Powerful Air Unit

Refrigeration equipment for the Navy' new jet laboratory at Trenton, N. J., could provide air conditioning for two areas the size of the Empire State Building.

This claim comes from the York Corp. of York, Pa., manufacturers of the three-stage refrigeration system to be installed at Trenton.

Under construction supervision by the Navy's Bureau of Yards and Docks, the new lab will comprise five test chambers. Two of these will be altitude cells, two will be standard test cells and one will be a turboprop stand. The lab is expected to be open for business shortly.

▶**Cooling Horsepower**—The refrigeration plant will develop 7,200 hp. in producing some of the test conditions. Air for the engines under test will be cooled in three stages with the final stage capable of either heating or cooling the air which is passed into test chambers.

First stage consists of three chambers, each with a bank of cooling tower water coils and Freon-12 recirculation coils. This stage drops the air temperature to about 40F by using cooling water and then three 1,600-hp. York turbo-compressor refrigeration systems. Air from this stage then goes to the second stage.

In the second stage, Freon-12 recirculation coils are used to cool the air to −23F, using three 600-hp. York refrigeration units.

The third stage of cooling can be made up of either of two systems. The first, known as the "C" rig, can cool or heat air to any temperature between −67F and 190F. Heating will be done by trichloroethylene coils.

The second system is known as the "D" rig, and will heat air to any temperature between −23F and 190F. Heating is done by ethylene glycol coils.

Initial design of the Trenton facility was begun in 1947 by the Navy. York is building the refrigeration and air-conditioning equipment for Mehring and Hanson Co., Arlington, Va., contractors for the air test rigs.

IAS Grants Awards

Dr. John Burlin Johnson, head of the metallurgy group of the USAF's Office of Air Research, has received the Institute of the Aeronautical Sciences' Thurman H. Bane Award for 1951 for "outstanding contributions in the field of high temperature materials used in aircraft propulsion units."

The Octave Chanute Award was granted by the Institute to Lt. Col. Marion Eugene Carl, USMC, who is head of the carrier aircraft section, flight test division, of the Navy's Patuxent River air test center. Lt. Col. Carl received his honor for "outstanding contributions to evaluation of advanced-type naval aircraft and for a continuously outstanding career devoted to the development of the art and science of flying."

Both awards were highlights of the recent IAS annual summer meeting in Los Angeles at which Lt. Gen. Benjamin W. Chidlaw, commanding general of the Air Materiel Command was to be guest of honor and principal speaker.

Dr. Johnson, a pioneer in the application of stainless steel to aircraft construction, began work on the use high temperature alloys for plane power plants during 1930, and is one of the first to have recognized the potentials of titanium and its alloys for military aircraft use. He has also been connected with research on the metal and metal-oxide combinations of silicon, molybdenum, chromium, zirconium, boron and aluminum.

Lt. Col. Carl, credited with 18½ Japanese aircraft during World War II,

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has been a flying officer in the Marines since 1939 and flew the Douglas Skystreak on its world's record breaking speed run of 650.796 mph., which stood from Aug. 1947 to Sept. 1948.

Tough Tests

Turboprop engine for Viscount stands up to rigorous 500-hr. trial.

Rolls-Royce's production turboprop for the Vickers Viscount—the 1,400-hp. Dart—has proved its stamina in a rigorous 500-hr. ground test just completed.

Following a test schedule in which British European Airways collaborated, Rolls-Royce technicians put the engine through a stiff routine to simulate conditions likely to be encountered in the Viscount's service.

▶**Test Conditions**—In one of the test runs that simulated engine operation on a hypothetical Rome-London hop, taxiing time was 6 min. at 6,000 rpm.; takeoff, 1 min. at 14,500 rpm.; climb, 42 min. at 13,300 rpm.; cruise, 2 hr. 11 min. at 13,300 rpm.; descent, 25 min. at 10,000 rpm., approach and landing, 5 min. at 10,750 rpm.; and taxiing in for 6 min. at 6,000 rpm.

During one representative flight in each 100 hr., takeoff power was boosted to 5 min., with climb and cruise run at maximum continuous power.

Sand was tossed into the schedule for the taxi-out and takeoff, and during the 500-hr. test time, about 225 lb. was ingested. And for other simulations, a "rainstorm" threw water on the engine at 60 gal./hr. rate during taxiing, and at 180 gal./hr. during simulated takeoff.

Oil temperature was maintained at maximum permissible (90C) during climb, to simulate extreme conditions.

During cruise, the de-icing system was operated for 30 min.

▶**How Parts Stood Up**—Combustion components—flame tubes, burners and liners—had previously run for 240 hr., bringing the time for these parts to 740 hr. No parts of the engine were replaced during the tests, except the exhaust pipe—a developmental unit.

Maintenance and inspections totalled 46.6 manhours—.092 per engine hour.

Time for the Dart on the test bed now exceeds 9,500 hr. Flight test time runs to 5,000 hr., without a breakdown.

Four of the engines will power the Viscount 701s, 28 of which have been ordered by BEA for its longer continental routes. Initiation of service with the plane is aimed for beginning of 1953.

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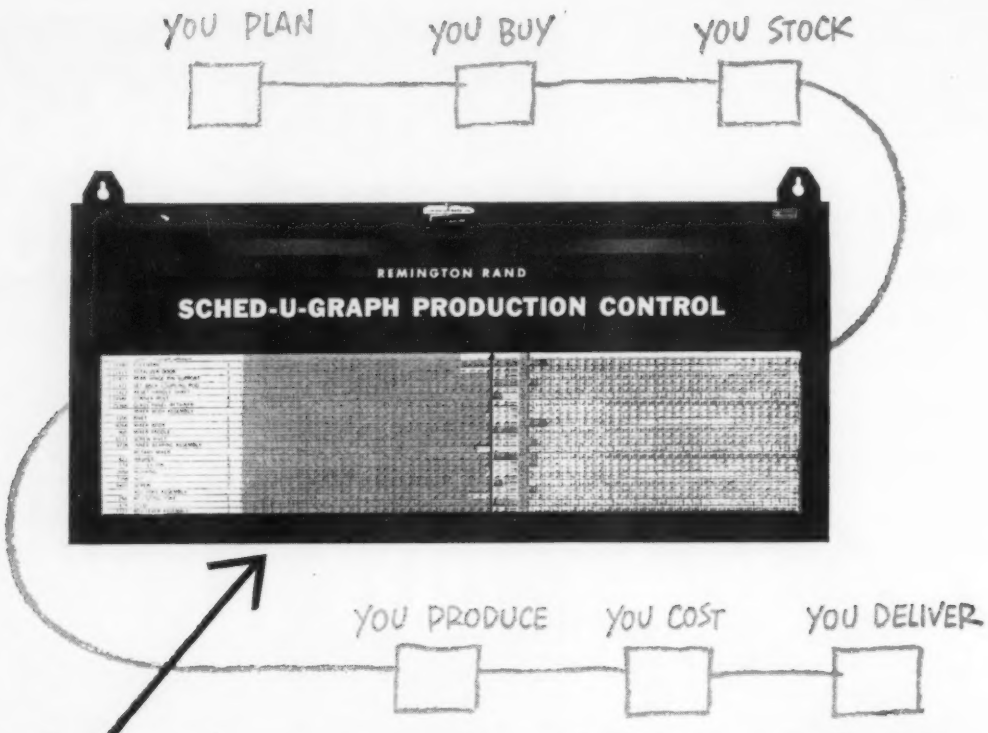


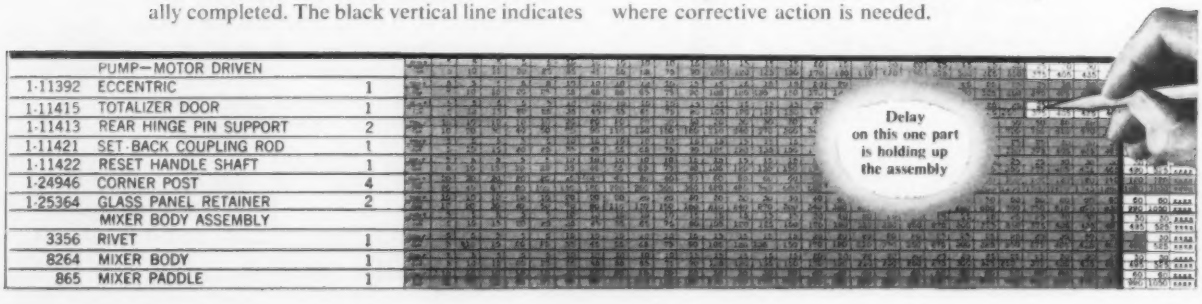
...but here's where you make-or-break your schedule

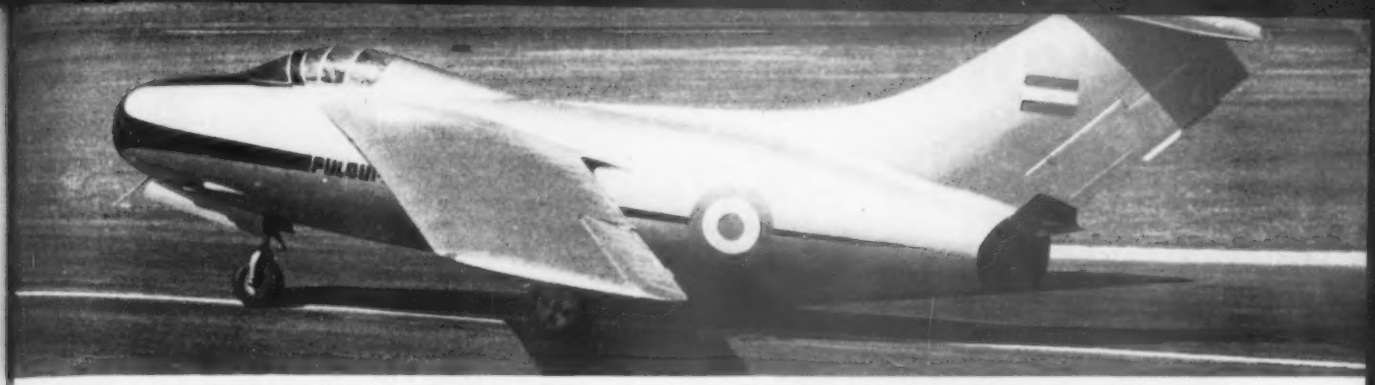
Just look below. You'll see why production men swear by Remington Rand Sched-U-Graph. This down-to-earth device *shows* you, graphically, how close each job is to schedule—*in time to take action if action is needed.*

Sched-U-Graph helped plants do "the impossible" in World War II. It is helping them again today . . . on all types of production and machine load problems. We'll rush without obligation our 32-page Sched-U-Graph Handbook (KD 341) if you'll just phone or write: Room 1222 315 Fourth Ave., N.Y. 10. **Remington Rand Inc.**

here's how Sched-U-Graph Production Control works

Top line on this Sched-U-Graph represents a pump assembly — each line below, one component part. On each line is recorded, in advance, each day's production quota and the total to date. The sliding bar signals show work actually completed. The black vertical line indicates today's date, and shows how much work should be done. In this case, all components but one—the totalizer door — are on or ahead of schedule, but the whole assembly is delayed. You see the delinquent in a flash, and know exactly where corrective action is needed.


PUMP—MOTOR DRIVEN
1-11392 ECCENTRIC 1
1-11415 TOTALIZER DOOR 1
1-11413 REAR HINGE PIN SUPPORT 2
1-11421 SET-BACK COUPLING ROD 1
1-11422 RESET HANDLE SHAFT 1
1-24946 CORNER POST 4
1-25364 GLASS PANEL RETAINER 2
MIXER BODY ASSEMBLY
3356 RIVET 1
8264 MIXER BODY 1
865 MIXER PADDLE 1
Delay on this one part is holding up the assembly



DOWN ARGENTINE WAY—First good photo of the Argentine I.AE 33 Pulqui II, which is believed to do about 650 mph. using a Rolls-Royce Nene II engine. Designed by Kurt Tank, formerly of Focke-Wulf, the Pulqui II has a T-tail, shoulder-high wing, and landing gear retracting into the fuselage. These features are becoming increasingly popular in new fighter designs here and abroad.

New Foreign Aircraft on View

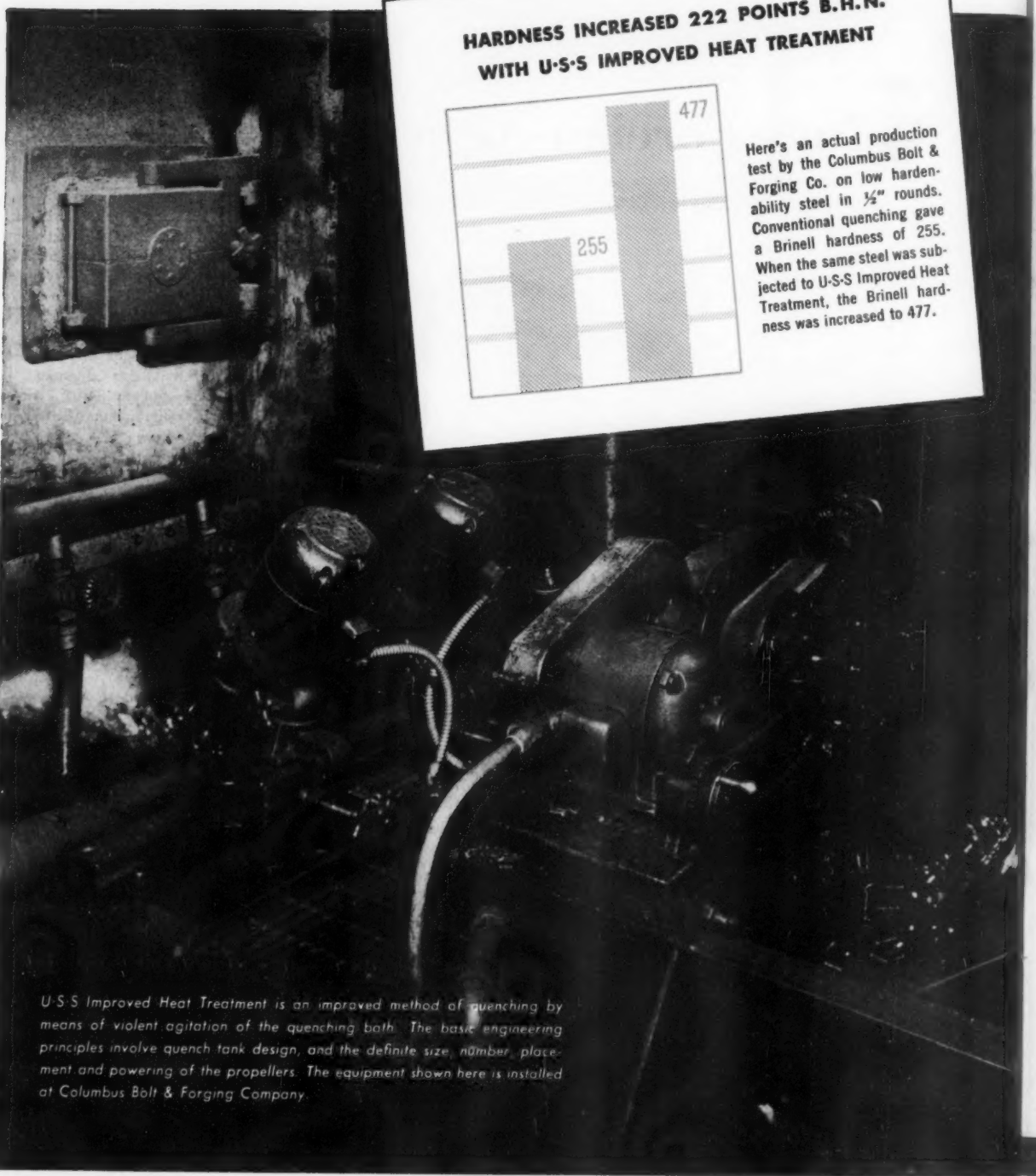
FINNISH TRAINER—Two-place Vihuri (left) is an all-metal trainer powered by an 840-hp. Bristol Mercury VIII radial fitted with a DH constant speed prop. Top speed is about 275 mph., cruising speed 218, and service ceiling 28,000 ft. Span is 33 ft. 1 in., length 28 ft. 6 in., and wing area 204 sq. ft. Gross weight is 5,840 lb. It has complete blind-flying equipment. The Vihuri, now being flight tested, has been built by the Aircraft division of the Finnish State Metal Works.

BRITISH NAVY TRAINER—Boulton Paul Sea Balliol (right) has recently completed carrier trails on the Royal Navy's HMS Illustrious and is now in production for that service. It is also being made for the RAF. It seats two side-by-side and is powered by a Rolls-Royce Merlin 35 of 1,055 hp. Top speed of the T.2 is 289 mph.; It weighs 8,450 lb. gross. Note the externally mounted carrier deck landing hook fitted to the Sea Balliol. This is said to be the first plane with side-by-side seating to land on a British carrier.

FRENCH TWOSOME—The Fouga Gemeaux I, powered by two Turbomeca Pimene jets of about 225-lb. thrust each, appears to have gone the Fouga Sylphe one better. By joining two Sylphe designs, the maker has come up with a dual-fuselage two placer. The Gemeaux I does approximately 205 mph. The later Fouga Lutin has two Turbomeca Palas jets slung under the wings.

HOW TO GET THE MOST OUT OF

—keep a sharp eye



HARDNESS INCREASED 222 POINTS B.H.N. WITH U·S·S IMPROVED HEAT TREATMENT

Here's an actual production test by the Columbus Bolt & Forging Co. on low hardenability steel in ½" rounds. Conventional quenching gave a Brinell hardness of 255. When the same steel was subjected to U·S·S Improved Heat Treatment, the Brinell hardness was increased to 477.

U·S·S Improved Heat Treatment is an improved method of quenching by means of violent agitation of the quenching bath. The basic engineering principles involve quench tank design, and the definite size, number, placement and powering of the propellers. The equipment shown here is installed at Columbus Bolt & Forging Company.

THE ALLOY STEEL YOU'RE GETTING

on quenching methods

TODAY, as critical alloying elements become scarce, all users of alloy steel are faced with the necessity of getting the most out of the steel they're receiving.

In most cases, this puts the problem squarely up to the heat-treater. Better heat-treatment methods can often do the job.

If you encounter difficulties, don't be too quick to blame the steel or the heating practice. The answer may be better *quenching* methods. More specifically, your problem might be solved with U·S·S Improved Heat Treatment — a superior quenching technique developed by United States Steel.

U·S·S Improved Heat Treatment extracts heat rapidly and *evenly* from every part of the material's surface. This treatment assures accurate timing, allowing removal of the material from the quenching bath while a certain amount of residual heat is present. Elapsed time from quench to tempering treatment is held to an absolute minimum. This not only improves mechanical properties; it also reduces cracking. And, this quenching method improves machinability by minimizing the formation of free ferrite in hypo-eutectoid steels.

The use of this quenching process is available to you without charge.

United States Steel does not manufacture or sell heat-treating equipment, but our metallurgists will be glad to analyze your heat-treating methods and make suggestions that may give you more uniform hardness, less rejects and less retreatment.

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COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Comments on U·S·S Improved Heat Treatment

by Mr. R. E. Christin, Chief Metallurgist
Columbus Bolt & Forging Co., Columbus, Ohio

"Quenching is a process often neglected in heat treatment. We feel it is just as important (if not *more* important) than any other phase of heat treatment. There is a tendency to concentrate too much on the heating—and lay too much blame for failure to the heating—when proper quenching could produce the objectives desired. Heating, even in the ideal environment, can be inadequate if quenching is faulty.

"Before we installed U·S·S Improved Heat Treatment, we occasionally encountered hardness variations in the as-quenched condition. These variations were loosely attributed to either the steel, or the heating or the quenching. However, after adopting the U·S·S agitated quench process, these hardness variations were practically eliminated, obviously indicating that conventional quenching was the chief cause of the hardness variations.

"After seven years' experience with U·S·S Improved Heat Treatment, we are convinced that this method is the answer to most hardening problems."

Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

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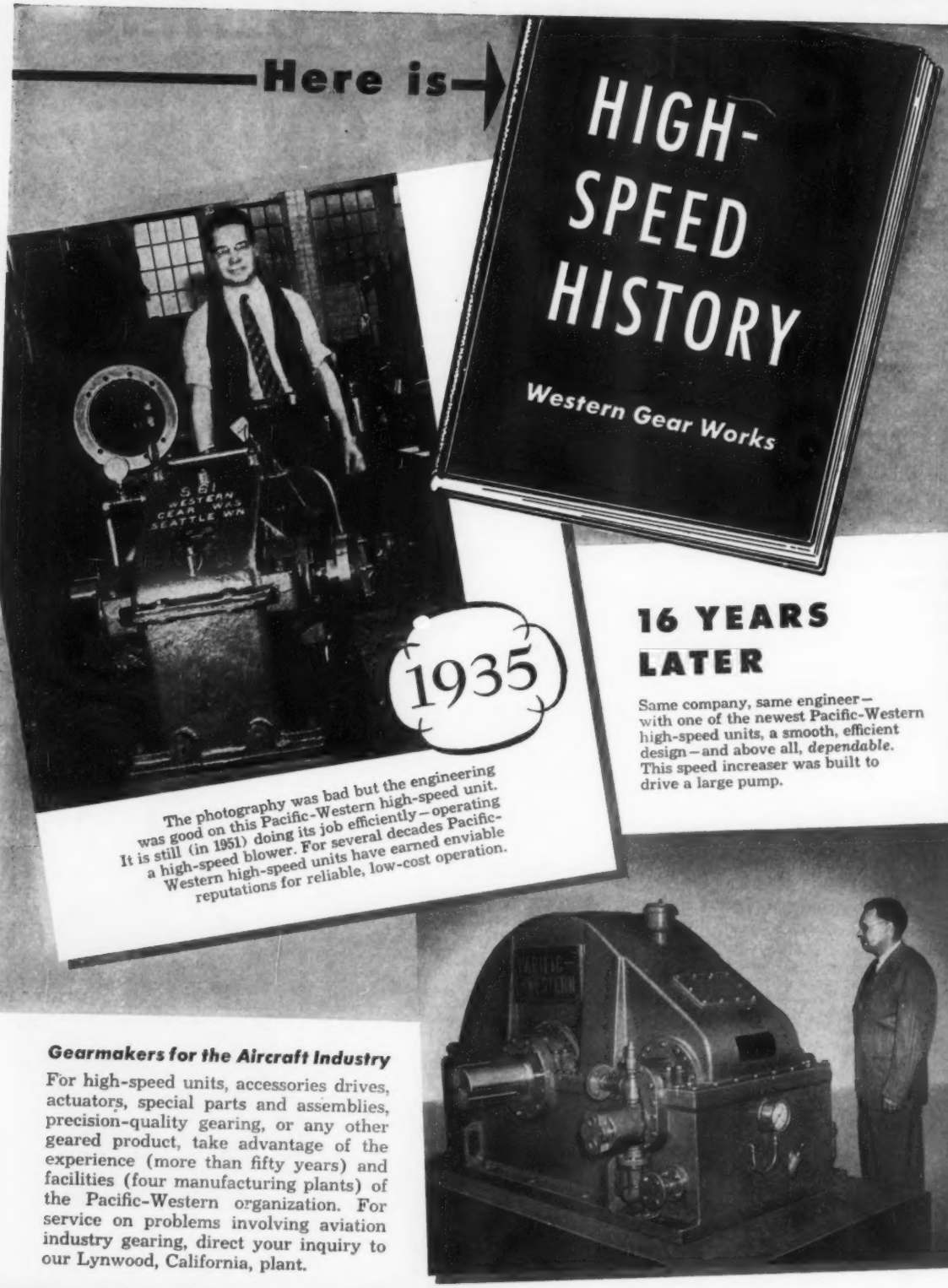
UNITED STATES STEEL

Here is →



1935

The photography was bad but the engineering was good on this Pacific-Western high-speed unit. It is still (in 1951) doing its job efficiently—operating a high-speed blower. For several decades Pacific-Western high-speed units have earned enviable reputations for reliable, low-cost operation.

16 YEARS LATER

Same company, same engineer—with one of the newest Pacific-Western high-speed units, a smooth, efficient design—and above all, *dependable*. This speed increaser was built to drive a large pump.

Gearmakers for the Aircraft Industry

For high-speed units, accessories drives, actuators, special parts and assemblies, precision-quality gearing, or any other geared product, take advantage of the experience (more than fifty years) and facilities (four manufacturing plants) of the Pacific-Western organization. For service on problems involving aviation industry gearing, direct your inquiry to our Lynwood, California, plant.

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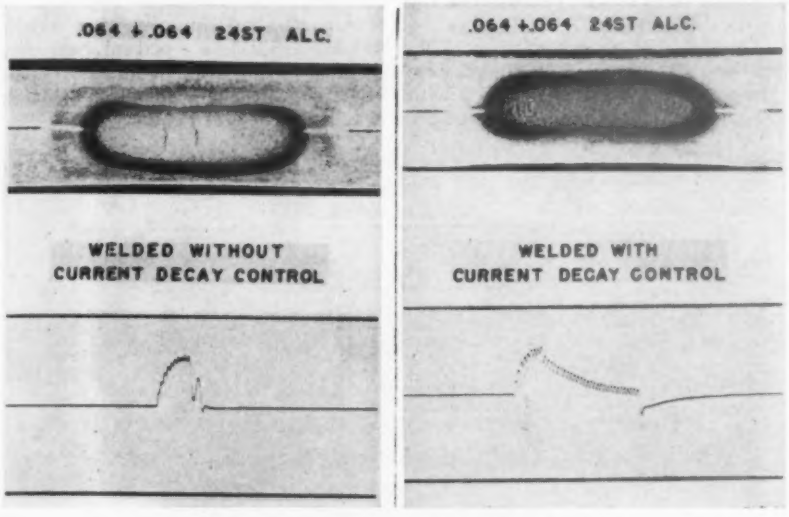

Improved Welding Aids Fabrication

Sciaky resistance welders with current decay control now produce nearly flawless welded joints.

Chicago—Certain components of an airplane can be put together ten times faster, more securely and more cheaply today than a few years ago because of the vast improvements in resistance welding equipment and techniques.

Maurice Sciaky, Basque-born general manager of Sciaky Bros., Inc., designers and manufacturers of resistance welding equipment used by the aviation industry, told AVIATION WEEK that spot welding can do a given job that much faster and at one-sixth the cost of riveting.

Of course not all joints lend themselves to spotwelding. And spotwelded joints will never develop play between surfaces as so often happens with riveted pieces. Moreover, spotwelds may be tailored to give any shear strength desired without the necessity of drilling larger holes.

▶**Scientific Spots**—Sciaky pointed out that spotwelding has become a science only in the last few years. Only recently has equipment been developed which permits an operator to make each weld "perfect." Resistance welding machines now being built are almost incapable of producing a defective joint. And Sciaky is going one step further.

They have built two machines which detect a bad weld. When the welding machine perceives that it has done a bad job, it identifies the defective weld with a spot of paint and turns itself off. This probably represents the ultimate in spotwelding refinements.

▶**Sciaky Sagacity**—Sciaky said that his brother David, the company's president, was responsible for two fundamental inventions in the art of electric resistance welding which allowed the process to become as scientific and flawless as it is today.

Initially, Sciaky said, electric resistance welding used single phase current. Although the results were acceptable, there were disadvantages. The power factor was poor, the power supply was unbalanced and the current demand was high. Each time a welder operated, the lights would flicker which made the machine unpopular with operator and towns people alike.

Sciaky's first invention did much to remedy these problems. Called the "storage of energy" principle, he used three phase current which was stored either in condensers or an iron core. When the current reached a certain volume it discharged and produced a weld. Advantages were improved power factor, balanced loads on a three phase line and power demand reduced by as much as 70 percent.

Disadvantage was that the machine's potential was very limited. It could weld only relatively thin gauges of aluminum. It was entirely unsuited to welding any ferrous alloys. But it was a step in the right direction.

▶**Jack Pot**—Sciaky hit the jack pot when he devised a refinement of his three phase low frequency system. He decided to rectify ac. to dc. and send it to a three-winding transformer. Here, before the transformer reaches the saturation point, the current is interrupted on the primary side, reversing the current's polarity and producing a pulse of preshaped dc. current.

This machine has all the advantages of the "stored energy" machine. Its power factor, for instance is practically at unity. More important is the fact that the welding current can be tailmade to fit any desired characteristics. Rate of rise and rate of decay of welding current can be adjusted with ease for any welding application. Result is that the machine can handle any weldable material in an ideal manner without compromise.

▶**Complete Machine**—In the Sciaky plant at 4915 W. 67 Clearing, Chicago, we saw one of the latest, largest and most expensive (about $50,000) machines—a completely automatic roll spotwelder.

This is what it would do: compress two pieces of metal between its massive, copper electrodes at a given psi.; shoot current through the pieces to weld them, and at the same time back off on the holding pressure to avoid flowing the metal as it became molten. At the end of the welding cycle, the electrodes suddenly increase their pressure in the "forging stroke," then release the metal. Two wheels in the welding machine's head automatically roll the piece a predetermined distance and the next weld is initiated at the exact distance called for from the preceding weld.

The entire cycle takes place in a fraction of a second. It is entirely electronically controlled and operated pneumatically and electrically. All the operator has to do is feed the pieces in one end, guide them through and then take out the finished product.

Maurice Sciaky said that his company was pretty well wedded to the aeronautical industry. He estimates that 99 percent of all electric resistance welding equipment in the industry is Sciaky products. Some 70 percent of his company's entire production goes to the aircraft industry. Pratt & Whitney alone has placed $1,300,000 worth of orders in the last six months.

Sciaky predicted that 1950's $6,000,000 business will grow to $12,000,000 in 1951.—GLC

Aircraft Shipments

Complete civil aircraft shipments, measured by airframe weight, came to 315,700 lb. in March, covering 273 planes, valued at $3.4 million, a 14-percent increase in number but a 9-percent decrease in value over February's shipments.

Cumulative totals for planes shipped

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PIASECKI HELICOPTER CORP.

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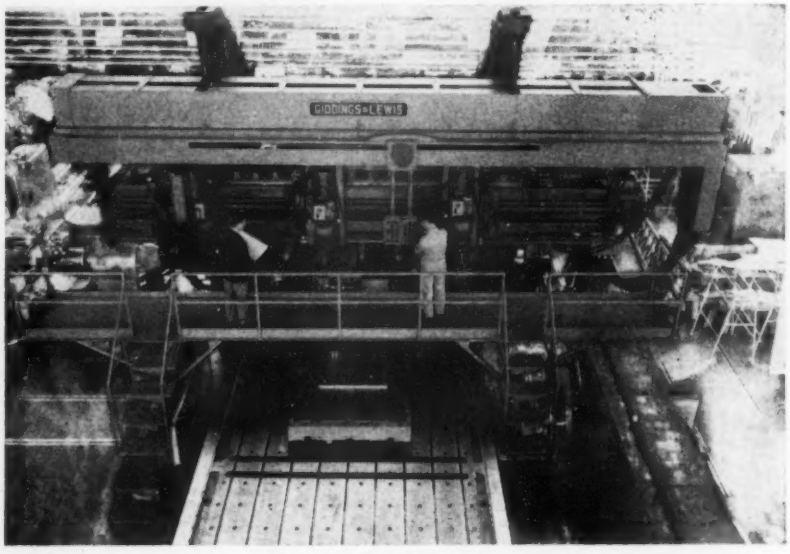
from January through March show a 7-percent increase in number and a 54-percent decrease in value over the same period of 1950. Civil transport backlogs increased from 458 in February to 571 in March.

Total of 359 aircraft engines (179,800 hp.) valued at $7.2 million were shipped during March, compared with February's 366 engines (176,000 hp.). Totals for January-March showed a 40-percent increase in number, a 44-percent increase in horsepower and a 38-percent increase in value over the same period last year.

Aircraft plant employment in March totaled 263,931, a 5-percent gain over February. Employment of 58,610 persons in plane engine plants for March was 4 percent over February.



Mill for Integrally Stiffened Skin of F-94

Sometime this summer Lockheed Aircraft Corp. will begin installation of a $750,000 giant skin mill specifically tailored for fabrication of integrally stiffened sheet to be used initially in the F-94.

This new machine tool is the most recent of the "heavies" that should be a continuing aircraft industry acquisition to meet the exacting production demands imposed by highspeed plane design.

Lockheed laid down the basic specs for the skin mill. Design details were worked out with Giddings & Lewis Machine Tool Co., the builder, and General Electric Co., which furnished the motors and control system. The machine is now nearing completion after a little more than a year of development —an extremely short time.

▶**Features**—This massive tool, 18 ft. high × 30 ft. wide × 80 ft. long and weighing 200 tons, will operate in three dimensions with two feed motions and work in a feed range of ¾ to 150 in./min. with a multitude of intermediate speeds.

A two dimension electronic tracer control will guide the longitudinal and lateral cutting motions simultaneously, and the machine will incorporate a vertical rise-and-fall cutting action for variations in web thickness.

Speed control and steering control for guiding the cutting angle are teamed for easy operation. An operator's bridge gives a good view over the cutter position and allows fast movement from one side of the machine to the other.

Trailing hoses and electrical lines are eliminated through use of a feed reel.

The work area is 10 ft. wide × 34 ft. long, and the table will handle 150-ton work load. Cutting speeds range up to 10,000 fpm., maximum metal removal 600 cu. in./min. Chip removal is automatic.

▶**Control**—GE reports that the adjustable frequency system used to control the cutting heads affords stepless speed control, less work-cycle time because of fast stops and starts, and better work quality and longer cutter life from close speed control.

Feed drives for the table and heads may be controlled individually by the operator of each of the two feed drives; by manual steering in which the operator turns a pointer in any desired direction in the plane of the table (the two feed drives will then run simultaneously with speeds coordinated); and by two-dimension contouring control that gives constant speed regardless of work outline, that affords automatic operation when desired, and automatic feed motor stoppage if tracer loses contact with template.

Extensive safety provisions are met.

New Tools Speed Convair's Production

Consolidated Vultee Aircraft Corp. is easing the workload at its San Diego plant with the continuing acquisition of new machine tools and equipment that will run to an approximate $1 million in cost.

Already it has put into operation a $30,000 Cincinnati Bickford precision drilling machine with Bullard spacer and four-way hydraulically movable table, and a $57,000 Hufford 60-ton stretch-wrap forming machine that will handle material lengths of 304 in. with 118,000-lb. pull.

The new machine order also includes 15 lathes, 17 mills, 6 grinders, 4 jig borers, 2 automatic screw machines, Hydrotel, 4-in. tube bender, Contourmatic saw, pipe pantograph, De Vleig jig mill, Excello Borematic, 2 General Electric box-type furnaces and a 40×8×7-ft. electric oven for age hardening of aluminum alloys and curing of Metlbonded assemblies.

The equipment will facilitate the production of the R3Y Navy turboprop cargo-transport seaplane, the Air Force's T-29 navigator-bombardier trainer, Navy guided missiles, and B-36D components fabricated for the Fort Worth division.

PRODUCTION BRIEFING

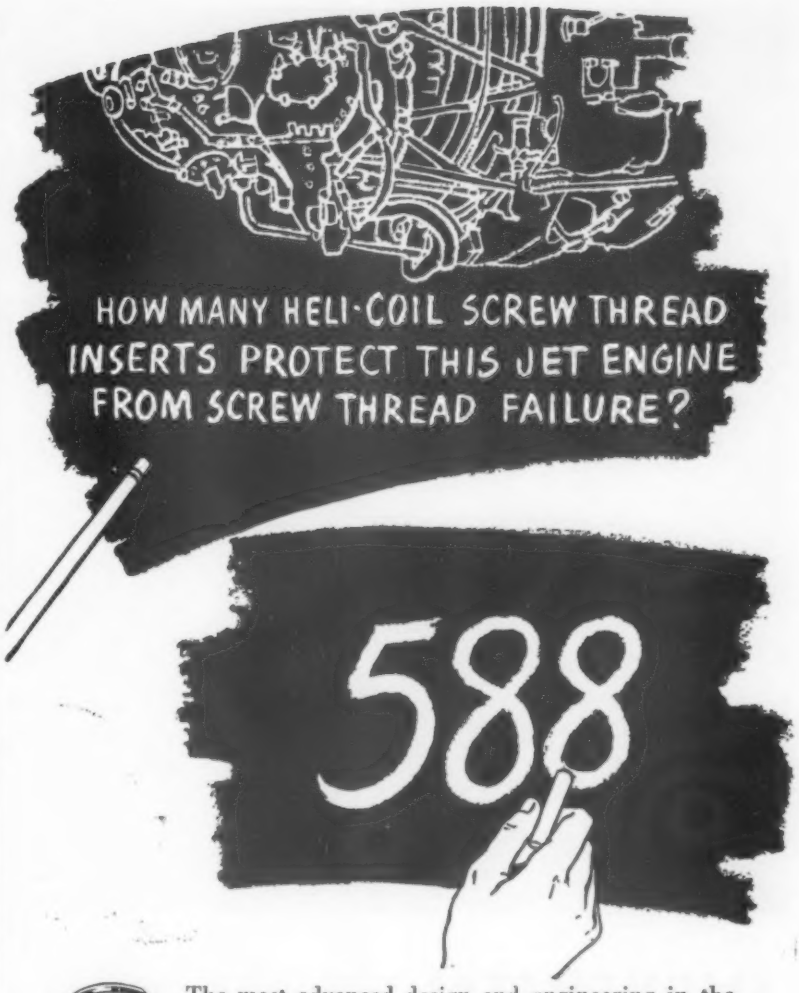
▶ **Air Carrier Service Corp.,** Washington, D. C., has purchased Quipco Associates, Inc., aviation supply house which has three buildings at Miami International Airport. Quipco has been a supplier to South American and domestic airlines. ACSC has also opened new sales and service office in Barranquilla, Colombia.

▶ **Cleveland Metal Abrasive Co.,** Cleveland, is completing a new addition to its E. 67th St. plant to permit 50-percent step-up in output of normalized and cut wire shot.

▶ **Republic Aviation Corp.,** Farmingdale, N. Y., has boosted employment to 11,500 from 4,800 in July, 1950. Company has about 900 women workers.

▶ **Ryan Aeronautical Co.,** San Diego, has opened an office in the Third National Building, Dayton, to serve the Midwest area, particularly in the metal products field.

▶ **Grand Central Aircraft Co.,** Glendale, Calif., has received a USAF contract to recondition a "substantial quantity" of cargo- and troop-carrying Douglas C-47s.



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It is the same type as 75S . . . stronger. Experimental quantities are now available in sheet and plate (either Alclad or bare), and extrusions.

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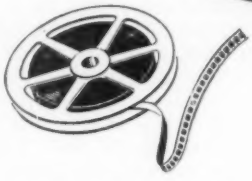
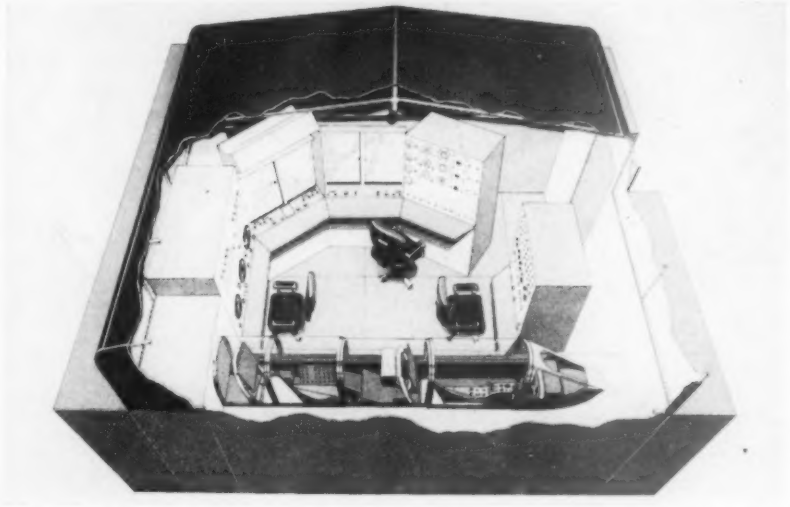
Alcoa Aluminum and Its Alloys. Properties, tolerances, sizes. 178 pages.

Designing for Alcoa Forgings. Covers types of forgings, applications, alloys, design and production details. 171 pages.

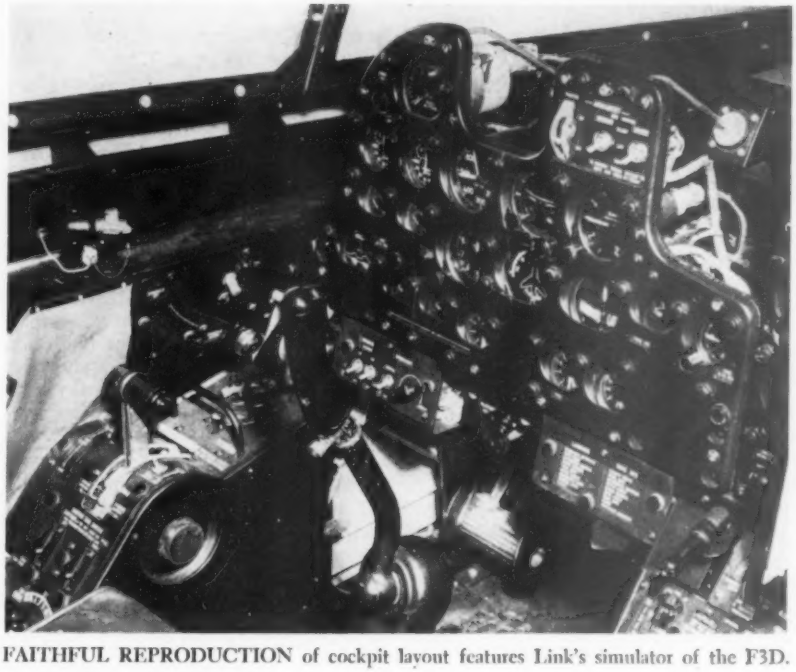


SOUND FILMS for group instruction are available on all principal methods of aluminum fabrication.

Your nearby Alcoa sales office will supply books free, lend you films. Or write ALUMINUM COMPANY OF AMERICA, 1800G Gulf Building, Pittsburgh 19, Penna.



F-89 SIMULATOR design is Link's latest contribution to synthetic training of pilots.



FAITHFUL REPRODUCTION of cockpit layout features Link's simulator of the F3D.

Link Thrives on Simulator Boom

Growing military interest in synthetic trainers spurs deeper analysis of pilot reactions in flight.

By George L. Christian

Binghamton, N. Y.—Mushrooming interest by the military in flight trainers and simulators is indicated by contracts recently awarded to Link Aviation for quantities of simulators for the Navy's SNJ and F3D and USAF's B-47B and F-89C. A large production order for C-11A trainers is also rolling through the plant, according to E. Allan Williford, vice president and general manager. Williford added that the C-11A is the first trainer ever developed for jet aircraft (F-80) and the first trainer to be quantity-produced.

And Wright Field recently announced expanded procurement of flight simulators. Contracts have been awarded to Curtiss-Wright for simulators for B-36, B-50, C-97, C-124 and F2H aircraft. North American Aviation and Engineering and Research Corp. will build simulators for the F-86D.

▶ **Difficult Art**—Designing synthetic flight simulators is becoming an exacting business. The "state of the art" is so new that engineers are not sure which are the most important parameters. They know that precise methods of measurement are needed to understand the vastly more complex job of flying tomorrow's transonic and supersonic jets and rocket ships as opposed to yesterday's wire and fabric crates. Designers have run out of yardsticks to measure pilots' psychological and physical limitations and capabilities.

Link aviation engineers, who developed the first electronic instrument trainer for jet aircraft, have had to establish a complete system for measuring the potentials of their own equipment—the simulators and trainers.

A trainer differs from a simulator in that the former duplicates the general flight characteristics and instrumentation of a family of airplanes, such a family being the F-80, F-84, and F-86 jet fighters. A simulator faithfully copies to the last detail the exact flight characteristics and instrumentation of a particular plane. Changes are even made to keep the simulator up to date with succeeding new models of one type of aircraft.

Link engineers told AVIATION WEEK that, because of the "startling rate of transfer" of students using the C-11A, actual instrument flight training could be cut in half. Experience gained by comparing the results of two groups of students—one trained on T-33s, the other on C-11A trainers—indicates that one hour of flight time plus one-half hour of trainer time is equivalent to two hours of flight time. And resulting savings on equipment are considerable, not to mention the elimination of accident hazards or the ability to do things in a trainer that you would not dare to do in a plane. W. W. Wood, Link's chief engineer, estimated that the cost ratio of plane vs. simulator is 10-1.

Pan American World Airways discovered that aircraft time required to give its pilots their semi-annual Stratocruiser checks has been reduced from 8 hours to 1.4 hours per year per pilot by use of a simulator.

▶ **From the Ground Up**—Link engineers said that both USAF and Navy have taken a deep interest in extending the use of trainers to teaching not only in-

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● The new LORD RC-27A Dynafocal is setting higher standards for isolation of engine vibration. Design improvements give increased smoothness . . . greater economy . . . longer life —at all engine speeds.

Performance compromises necessarily inherent in many previous designs have been eliminated.

Superior efficiency reduces dynamic stresses throughout airframe structure . . . improves passenger comfort . . . reduces operating personnel fatigue . . . lowers maintenance costs.

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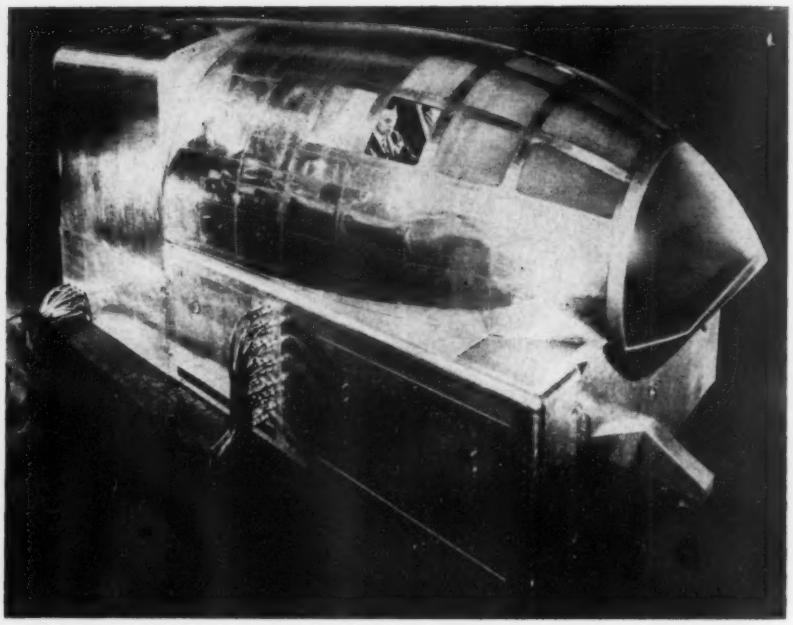

BOMBER simulator such as this trains pilot, co-pilot and engineer simultaneously.

strument flying but also primary flying, and are each getting ten trainers.

An aeronautics bulletin published by the Institute of Aviation, University of Illinois, entitled "Evaluation of the School Link and Special Methods of Instruction in a Ten-Hour Private Pilot Flight-Training Program" states, among other things, that "the criterion of overall grade on flight test showed that the Link group received a significantly higher mean score than the control group. . . . The Link-trained group was more proficient with respect to the several criteria analyzed." (AVIATION WEEK Sept. 4, 1950, p. 40.)

The monograph concluded that "the time required to train students to pass this test may be substantially reduced from the 35 hours now required."

► **Checking the Yardstick**—"You don't know anything about anything until you measure it," might be a basic tenet of Link.

Not content with necessarily inaccurate human evaluation of a student pilot's proficiency, Link undertook to measure with scientific precision the many variables composing these problems.

In cooperation with the Psychology Branch of the Air Materiel Command, Link developed the equipment known as Airborne Laboratory for Engineering Psychology.

The ψ tests, as they are called, are used in the Airborne Laboratory by the Aero Medical Lab., Engineering division, to tackle such problems as: "How can the pilot's task be simplified? How can reading of instruments and the speed of control operation be speeded up to keep pace with ultrasonic aircraft? How many crew members are required to fly a 100,000-hp. aircraft safely?"

To answer these and many other questions, Link has worked out an electronic recording and scoring system which, used in an actual airplane, shows up a pilot's ability with complete objectivity. Purpose is to build a foundation of data from psychological and physical reactions for use in perfecting design of flight simulators and trainers.

► **The Scoring System**—Instead of depending on the imponderables of a check pilot's opinion, the integrated scoring and recording equipment automatically grinds out numbered answers showing psychologists, with mathematical exactness, both plus and minus mean and squared errors committed by the pilot. For instance, a pilot is told to hold airspeed as close as possible to 250 mph. He is allowed a tolerance of $\pm$ 2½ mph. As long as he holds the airspeed between 247½ and 252½ mph. the scoring clock for this variable continues to run. When he exceeds these limits, the clock stops. The percentage of time the scoring clock operated compared to total time is an index of the pilot's efficiency.

Variables capable of being recorded are: aileron, elevator and rudder position; two throttle positions; two prop governor positions; aileron, elevator and rudder pressure; airspeed; altitude; angle of bank; vertical speed; glide path and localizer; rate of turn; pitch; inclinometer; grip tension (control wheel).

To complete the record of pilot performance, recorders pick up his voice procedures and movie cameras register his body and eye movements. An air turbulence meter indexes the average air turbulence encountered during a

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The planning of an airport runway lighting system is vitally important. So L-M offers you a complete runway lighting engineering service.

L-M has been in the airport lighting business for many years. Its engineers know lighting. More important, they know what the pilot must see, and do, when he is coming in for a landing. The *aviation* problems of a runway lighting system are as important as the electrical and the optical problems.

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Ask the L-M Field Engineer for the L-M Airport Runway Lighting Data Check Sheet, or write Line Material Company, Airport Lighting Division, Milwaukee 1, Wis. (a McGraw Electric Company Division).

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L-M high intensity unit with fixed focus, type L 819.

L-M medium intensity runway light for smaller airports, and for taxiways at larger airports.

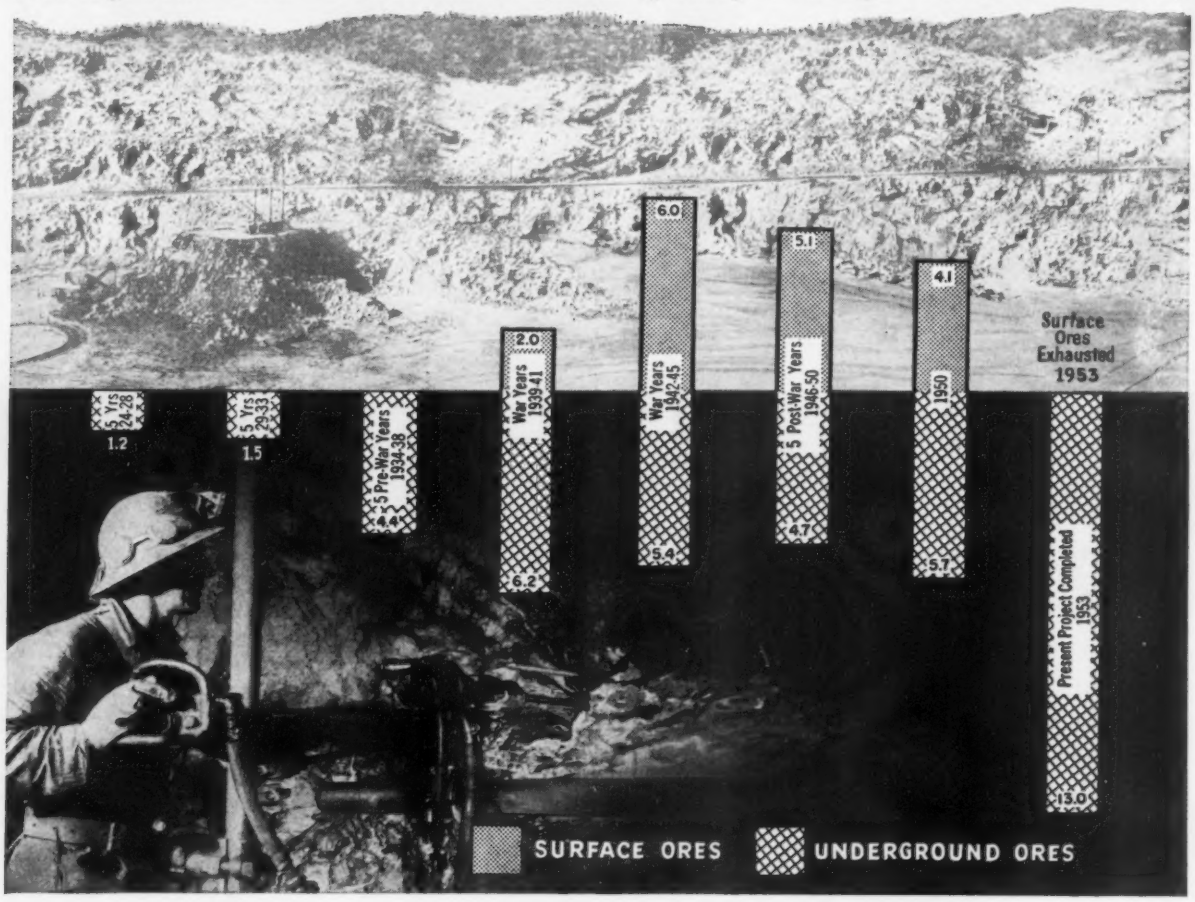
L-M revolving beacon for Class I, II, and III airports.

L-M marker and obstruction lights, single or double.

L-M control panels for large and small airports.

41-R

Underground and surface ORE MINED (yearly average—millions of tons)



Underground for Defense

...started more than 10 years ago

STRENGTH...military and economic ...depends on productivity. And productivity depends on men who have devoted long years to their specialized chosen field of endeavour.

Such men with "know-how" mine nickel from the rocky rim of Ontario's Sudbury Basin...

By increasing output with maximum speed and drawing on reserve stocks of nickel previously accumulated, they helped raise deliveries of nickel in all forms during 1950 to 256,000,000 pounds...a record for any peace-time year.

This record, 22% greater than the 209,292,257 pounds delivered in 1949, was no accident...

In 1937, INCO launched a vast long-range project which now makes it possible to meet the military requirements of the United States, Canada and the United Kingdom. In addition, nickel deliveries are being made to government stockpiles and the balance of the supply is being rationed among civilian consumers in all markets throughout the free world.

Since the inception of International Nickel, its fixed policy has always been to increase the supply of nickel. To meet today's needs, INCO went underground years ago.

Anticipating the eventual depletion of Frood-Stobie open pit surface ores, more than 10 years ago, INCO embarked on a program of replacing open pit with underground capacity. This required extensive enlargement of underground plants, development of new methods of mining not previously undertaken and the revamping of metallurgical processes to cope with difficulties in recovering nickel from the new types and lower grades of ores which have to be reached.

Major expansion in output of nickel from underground operations is being driven to conclusion with utmost speed. There is still much construction to be done and a number of mining and metallurgical problems remain to be solved and tested in actual operation. Barring unforeseen interruptions, full conversion to underground mining should be completed in 1953.

When the present undertaking is completed, INCO will be able to hoist 13,000,000 tons annually, and the size of its underground mining operation will surpass that of any other non-ferrous base metal mining operation in the world.

This underground expansion is being completed by INCO without interrupting current production of nickel, which is at maximum capacity.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

problem. Thus, data obtained under varying weather conditions can be reduced to a common reference level.

▶**Gunnery Trainer**—Yet another step was recently taken by Link towards broadening the scope of its electronic trainers. The company developed a Flexible Gunnery Trainer. The unit not only scores the gunners hits, it also electronically evaluates his proficiency and is capable of simulating any number of combat situations as they occur in modern high-speed air attack.

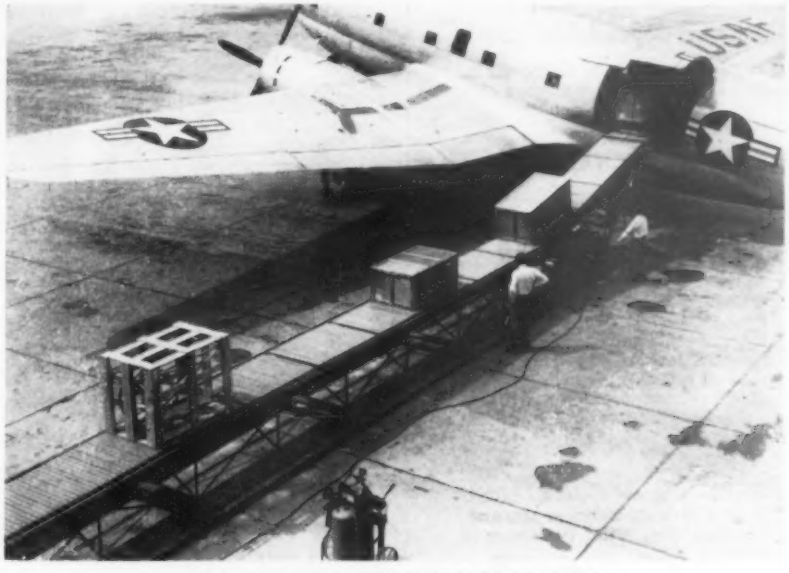
Simulators are not cheap. Williford quoted prices for prototype models at $60,000 to $950,000. Yet this is a small fraction of the cost of the prototype aircraft being simulated. Complexity of the units may be gathered from the fact that the B-47 simulator will contain some 500 miles of wiring, 690 vacuum tubes and 350 relays. Link engineers are still puzzling over many problems because the "state of the art" of simulator advancement is almost limitless—as limitless in fact as the development of aircraft.

▶**Unanswered Questions**—Among the unsolved questions are: where is the reasonable compromise between accuracy and complexity of a simulator in relation to its cost? A slight increase in the former can entail a great increase in the latter, after a given point. What simulation is most valuable and why? Constant research into these and other problems is paying off. Link is improving simulation by making it more accurate and is reducing cost at the same time.

"Flights" in Link trainers and simulators (SNJ, F-80 and F3D) underline the fidelity with which the units duplicate the airplane's every characteristic: stick forces, variable with airspeed; flight idiosyncrasies; engine noise, either the roar of a piston job or the scream of a jet; flying through cloud formations, lightning, increasing dawn or approach of night; the screech of the tires as they meet the runway. And all the while, various degrees of "rough air" jolt you around the cockpit. About the only thing lacking is a sense of physical acceleration. And every malfunction the real plane is subject to can be duplicated to heckle the pilot.

When you "crash" a simulator, inricated vividly by a red light illuminating the windshield, you come out sweating, so realistic is the experience. The realism is enhanced by cockpits which are exact replicas of the original. In some cases, they are the real thing furnished by the airframe manufacturer.

Link employes are happy about the



UNTOUCHED BY HUMAN HANDS

The latest wrinkle in aircraft cargo loaders was recently unveiled at Kelly Air Force Base, Tex. Claimed to be the first completely mechanical loading system, the conveyor set a record in unloading 4,774 lb. of freight from a C-47 in 8 min. flat. The two-section platform consists of a stationary, 58 ft.-long section and an extendable 56-ft. section which runs out from the terminal to the plane. When not in use mobile section retracts under its own power under the stationary part. Cargo is moved by hand on rollers on the indoor section; rollers of the outside section are powered to carry freight automatically to the aircraft. A hydraulic lift adjusts the height of the unloading end to accommodate these planes: C-46, C-47, C-54, C-74, C-82, C-97, C-119 or C-124. It is stressed to carry 1,000 lb. per pallet. The entire mechanism can be operated from within the terminal, eliminating all manual cargo handling from the time it leaves the building until the crew receives inside the plane.

This picture* does not equal 10,000 words

This is a fine photograph—but men and machines are only part of the story at IGW. It takes esprit de corps (a much overworked term that fits here)—it takes pride of workmanship to produce fine precision gears and parts.

* This Horizontal Jig Borer is typical of the high precision tools designed and built by Indiana Gear for their own use.

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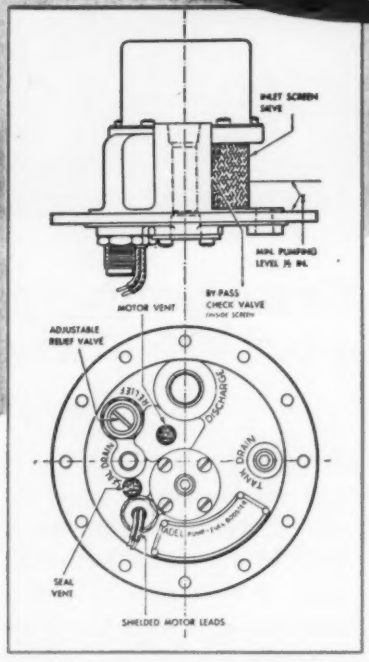

They're Small, Compact
They're Lightweight
They're Dependable

Impeller type pump, designed, and fills the need, for a submerged fuel boost pump for smaller Aircraft and Helicopters.

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DUTY: Continuous.
OUTPUT: 40 g.p.h. min.
DISCHARGE PRESSURE: 11 p.s.i.g.
D. C. VOLTAGE: 24 & 12.
CURRENT: 2 & 4 Amps.
AMBIENT TEMP. RANGE: −65°-+160°F.
WEIGHT: 2 lbs., 7 oz.
SIMPLE CONSTRUCTION.
Integral relief valve is adjustable between 3 & 12 p.s.i. and it limits shut-off pressure to a max. of 2 p.s.i. above pressure at rated flow.

Pressure drop through by-pass check valve is one inch mercury max. at 80 g.p.h.

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lively spirit Williford has infused into the company since his arrival last year. Fat new contracts, $1 million for the B-47 simulator, some $6 million for the F-89C and $10 million for the C-11A are tangible good news.

A philosophy of smooth teamwork between engineering and production, plus the establishment of a product design review board, results in practically flawless prototype models. Example is that the first C-11A trainer was delivered one month after the first switch was thrown; three months had been alloted for final check.

The future will see no slackening of activity at Link, according to Williford. The company is already attacking the challenging problems of developing trainers and simulators for transonic and supersonic aircraft. And, for pilotless planes, controller trainers will be needed.

New Grease

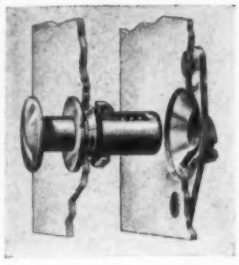
A new, wide-temperature-range grease guaranteed to give satisfactory lubrication of aircraft gears and actuators from −65 to +250 deg. has just been announced by the Shell Oil Co. It maintains its consistency to provide complete lubrication throughout the temperature range indicated.

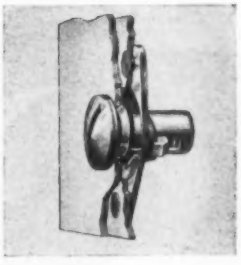
Labeled Aeroshell Grease 7, it is also an extreme-pressure lubricant with excellent load-carrying characteristics according to J. S. Harris, manager of Shell's Aviation Department. The grease contains synthetic oils and fortifying agents.

LARGE SIZE "CAT"

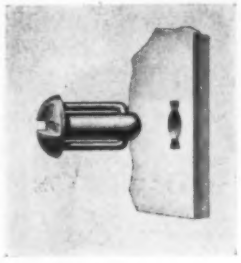
This 36,000-lb. "Cat" hauls British Overseas Aircraft Corp.'s Boeing Stratocruisers around Dorval Airport, Montreal. A large winch on the rear of the machine also helps slide the planes sideways, on track-mounted dollies, in and out of hangars. Weight plus large rear tires eliminate need for chains. This was demonstrated when the Caterpillar DW10 tractor pulled Stratocruisers on runways over glare ice covered with newly fallen snow. All four tires are filled with 100 percent calcium chloride solution. Front pressure is 42 lb., rear 45 lb.

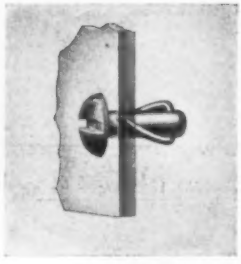
3 ways to save on assembly costs



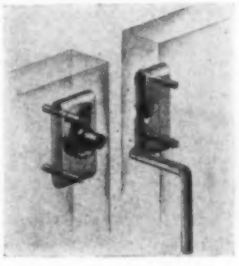


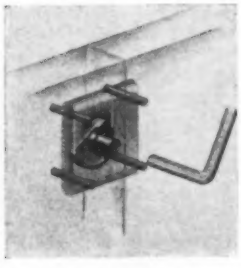
QUICK-LOCK For fastening removable access doors and panels. Because of its ease of installation, QUICK-LOCK is ideal for assembling removable panels. A 90° turn locks it in place. Stud is self-ejecting when unlocked; visual inspection shows whether fastener is locked. Spring loading takes initial load; solid supports carry increased load. Available in a wide range of sizes.





SPRING-LOCK One-piece fastener for blind holes has load-carrying steel spring wire. Spring steel arms lock fastener securely, prevent loosening under vibration. SPRING-LOCK will work with varying panel thicknesses, locks with a twist of the wrist. SPRING-LOCK is now available in high-impact plastic. The molded design permits heads to be made in various shapes for refrigerator shelf supports, washer knobs, brackets. Available in a wide variety of shapes and sizes, and also in custom designs.





ROTO-LOCK Serrated, tapered cam is engaged by formed lug as fastener is locked. Cam action draws panels together tightly, insures locking even under conditions of misalignment. Opens easily for demounting. ROTO-LOCK carries heavy tension and shear loads; can be used for air and water-tight seals; recesses completely into panels. Solidly built without springs or delicate mechanical parts, unaffected by arctic temperatures or field service.

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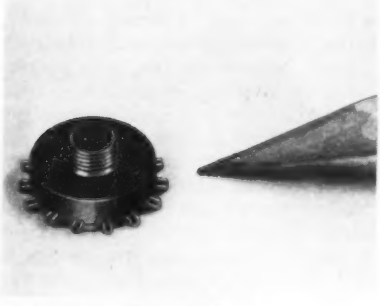
NEW AVIATION PRODUCTS

Loran Amplifier

A new signal amplifier for airborne Loran (long range navigation) systems has been developed in the laboratories of Radio Specialty Mfg. Co., Portland, Oregon.

The unit has reached the production line and some deliveries already have been made to Boeing Airplane Co., the radio firm reports. The signal amplifier was designed to meet extremely rigid Air Force specifications. According to the company, it functions properly over a temperature range of 250 deg. and meets all vibration and shock tests.



Rotary Switch

A tiny rotary switch, said to be one-tenth the size of conventional switches used for the same purpose, has been developed for use with avionic equipment in aircraft and guided missiles by the Electro Development Corp.

The new switch lends itself to many applications previously considered impractical and offers many combinations for complex circuits, according to the manufacturer. Plastic parts in the unit are compression molded of the plastic insulator known as "Plaskon Alkyd." Insulation between the shaft and contact arm will withstand 2,500v. a.c., says Electro. Contacts are pure silver. The contact arm is silver-plated beryllium copper, heat-treated for maximum strength. Dimensions: body thickness, $\frac{7}{16}$ in.; diameter, $\frac{3}{8}$ in. The maker's address is 6014 W. Washington Blvd., Culver City, Calif.

Lightweight Scale

A compact, lightweight scale for weighing cargo, designed for installation as an integral piece of equipment in aircraft or for field use at advanced bases has reached the aviation equipment counter.

The unit is called the Seabeck Scale, after its inventor, Lennert Seabeck. It is available in quantity immediately, since it already is being manufactured by the Swan Tool Co., Hartford, Conn, for applications other than aircraft.

Features of the device may possibly make it a convenient item for use both in cargo airplanes and helicopters. The unit has been submitted to the Navy's Bureau of Aeronautics and the Air Force for evaluation.

The scale, presently constructed to weigh objects from two to 352 lb., has a hook on the top to attach it to an overhead support, and a hook below for suspending the cargo item to be weighed.

Perhaps the scale's biggest military potential is in advanced areas under emergency loading conditions where there is no cargo manifest. Also it could be used as an added precaution to double-check weight of cargo accompanied by manifests.

Aviation distributor of the device is Huntley Chapin of North Hollywood, Calif. Says Chapin, an operations officer during World War II in the Marine's Transport Air Group: "I supervised the loading of tremendous amounts of air cargo and mail. Being located at advanced stations, I never was in possession of platform weighing scales and was forced to become a first-class weight guesser. Believe me, this was a severe strain at times as all our flights were over water . . ." Distributor's address is Box 117, Valley Village Station, N. Hollywood, Calif.

Light Flasher

A position light flasher, meeting CAA requirements as outlined in TSO-C18 and SAE Aeronautical Standard AS 211, has been developed by John B. Rudy Co.

The flasher is said to be of compact, sturdy construction. It incorporates fail-safe features and is provided with a radio noise filter. The new flasher weighs 2 lb. 11 oz. Price is $85 FOB. John B. Rudy Co., 1113 Airway Dr., Glendale 1, Calif.

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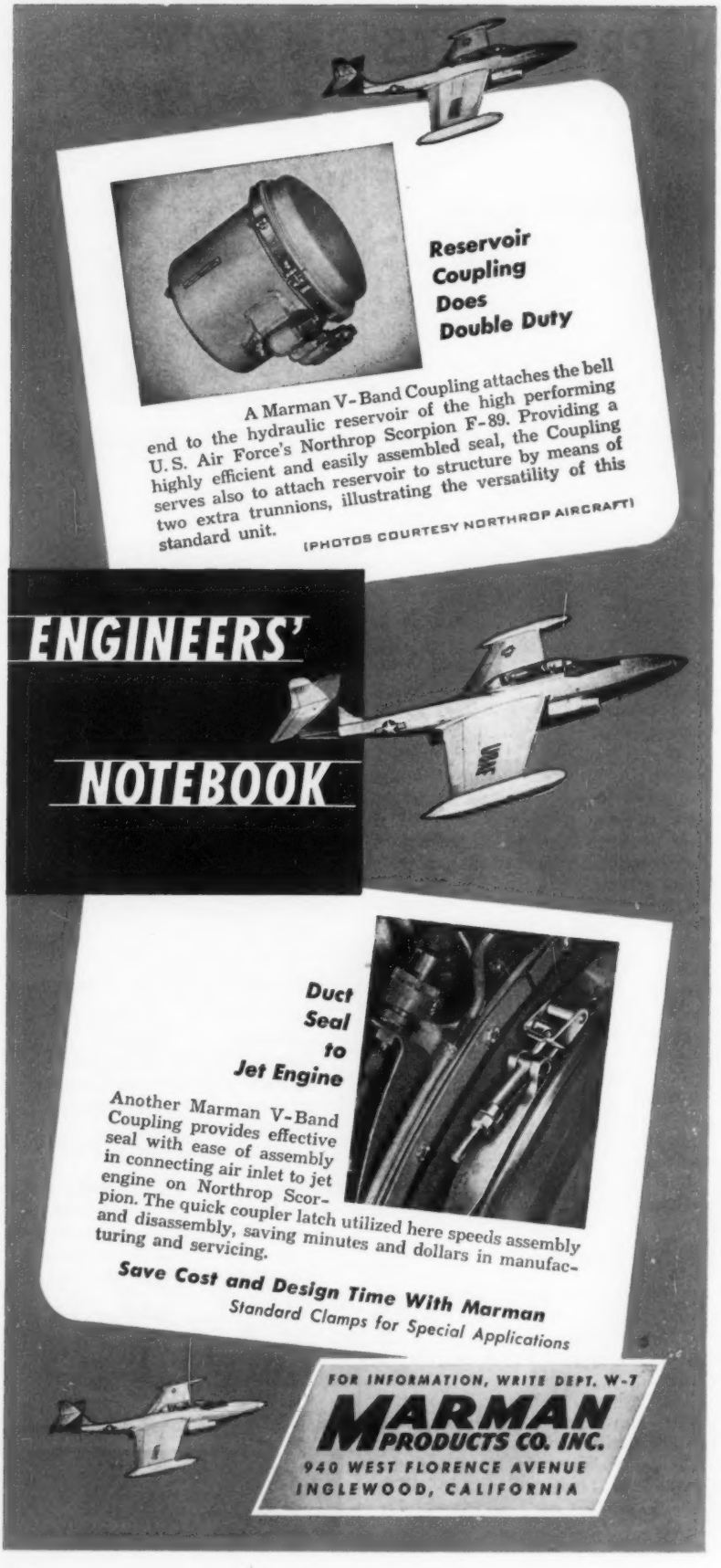
ENGINEERS'
NOTEBOOK
Reservoir Coupling Does Double Duty
A Marman V-Band Coupling attaches the bell end to the hydraulic reservoir of the high performing U. S. Air Force's Northrop Scorpion F-89. Providing a highly efficient and easily assembled seal, the Coupling serves also to attach reservoir to structure by means of two extra trunnions, illustrating the versatility of this standard unit.
(PHOTOS COURTESY NORTHROP AIRCRAFT)
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Another Marman V-Band Coupling provides effective seal with ease of assembly in connecting air inlet to jet engine on Northrop Scorpion. The quick coupler latch utilized here speeds assembly and disassembly, saving minutes and dollars in manufacturing and servicing.
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Protective Mountings

If you are a producer or shipper of sensitive mechanisms and want better protection for these during shipment, or feel present packaging arrangements are cumbersome and inefficient, Lord Mfg. Co. claims it can solve your problem.

Lord, a developer and producer of shockmounts for engines and sensitive components in aircraft, has extended its activities by focusing its engineering skill on problems attendant to shipping products. It has devised a new method for shockproofing shipments in which the item is supported in the shipping container by shear-type rubber mountings. These are designed to isolate shock forces and prevent damage when the case is dropped or roughly handled.

Lord shipping mounts can be selected for the protection of a specific machine. In effect, they are engineered to the exact requirements of your particular product. Says Lord, "Proof of their ability to furnish protection is offered by well over a thousand foreign shipments which arrived without breakage or malfunction."

Other advantages of the new method listed by the company:

- Mountings may be reused indefinitely.
- Packing and unpacking time is reduced.
- Cost of inspection and adjustment at destination is reduced.
- Machines may be tested on arrival without removal from packing case.

Lord believes use of such packing materials as paper, excelsior felt, cork, popcorn and others have many disadvantages, such as introduction of foreign particles into operating mechanisms, need for storing bulky, inflammable materials and impracticability of reuse. However, the principal objection to these materials, the firm stresses, is that the shipper cannot calculate and supply exactly the right amount of resiliency to insure maximum protection. Address: Lord Mfg. Co., Erie, Pa.

Gasket Material

A gasket material, Duroid 3102, compounded for high resistance to oil, water and gasoline, has been developed by Rogers Corp., Manchester, Conn.

This material, an asbestos-neoprene product, is designed to perform at temperatures up to 300F. It is Rogers' latest addition to a new group of formulations designed to blanket the range of material properties from laminated phenolics through vulcanized fiber to paper boards.

Besides having good resistance to water, oils and gasoline, Duroid also is highly flexible and has a bursting strength of 500 psi., the company states.

We Mobilize for Freedom

CONTROLS . . . A Two-Edged Sword

It may seem dangerously premature to talk about getting rid of emergency government controls while all-out war is still an imminent possibility.

But success in this strange struggle for our freedom into which the Russian Communists have plunged us requires that we:

1. Maintain a whole battery of controls designed to speed defense production and curb inflation, and at the same time

2. Work to end the controls at the earliest possible moment.

Here is the reason why this editorial—fourth in a special series on mobilization for defense—is devoted to the need for a speedy release from controls.

If the Russian Communists can force us to maintain indefinitely the present system of government controls, they will have won a tremendous victory. They will have saddled us with a system of collectivism which, over a period of years, would be fairly certain death to freedom of business enterprise.

Make no mistake about it. This is not an argument against emergency controls. We need controls now to break a right of way for our mobilization program through the business boom. Indeed, the third editorial in this special series was titled "Why Controls Are Necessary." It stressed both the need for controls and the need for positive cooperation to make them work.

Controls Can Undermine Our Economy

But these controls surely chisel at the foundation of our normal economic system. So long as we have them, many if not most key business decisions will be made in Washington bureaus rather than in the free market place. For example, the *National Production Authority* administers a *Controlled* Materials Plan (italics ours) which directs the flow of basic metals, and decides who can use them for what purposes.

Happily, the people who operate these controls are not using the methods of a secret police state.

Even more happily, most of the leaders who have been drafted to manage the controls are not in love with their jobs. They are doing their best in the thankless task of making controls work. They recognize the danger of chronic controls.

But the fact remains that our economy is

operating under arrangements which carry it a long way toward the pattern of centralized control the Russians would inflict on the world.

The Wilson Plan

A plan for getting rid of these controls has already been developed. It was put together by our Director of Mobilization, Charles E. Wilson — while he was working day and night to set up the necessary emergency controls.

The Wilson Plan — if we escape all-out war — will strengthen our defenses and our economy. By 1953, it calls for:

1. Providing the weapons to equip an armed force of 3½ to 4 million, together with a supply of weapons for our allies.

2. Building a stockpile of weapons which, with current production, would be sufficient to carry on an all-out war for a year.

3. Building the manufacturing capacity by which we could rapidly expand our production of weapons if all-out war should come.

4. Increasing the productive capacity of industry enough to resume the expansion of our civilian economy.

With these jobs done our economy would be big enough and strong enough to meet both civilian and military requirements. And the government controls needed for mobilization could be speedily dropped.

Call for Sacrifice

The Wilson Plan requires a major effort — it means spending more than $50 billion a year for mobilization. That is almost 20 percent of our total production. And this cannot be done without sacrifice. For a time, particularly in the next year, living standards will drop.

But the sacrifice required is amazingly small. At the peak of the defense effort, civilians will still have available to meet their needs about as much as they did in any year before 1948.

To make the Wilson Plan succeed we must curb inflation. A second year of inflation such as that which we have had since the Korean war started would multiply disastrously the costs of our defense program. One key part of a successful program to curb inflationary pressure, which soon will be building up again, is a pay-as-we-go tax program. The second editorial in this series urged that we do our utmost to pay as we go.

We Cannot Out-Control the Communists

But, above all, to make the Wilson Plan work we must keep our sights set on the crucial importance of increased production. Our problem is to increase our capacity to produce so that we can carry both a major military program and an expanding civilian economy for as many years — General Bradley thinks it might be fifteen or twenty — as the menace of Russian Communist aggression persists.

If we do not produce enough to do this double job, we shall be confronted with the prospect of having to live indefinitely under government controls of the sort that have been set up since the start of the Korean war. That would be delightful to the Russian Communists. It would go far toward making over our economy on the Moscow model.

Even if we wanted to, we never could hope to out-control the Russians. They are miles ahead of us in that line. But we can out-produce them, by a tremendous margin. By doing that we shall travel the surest road to victory.

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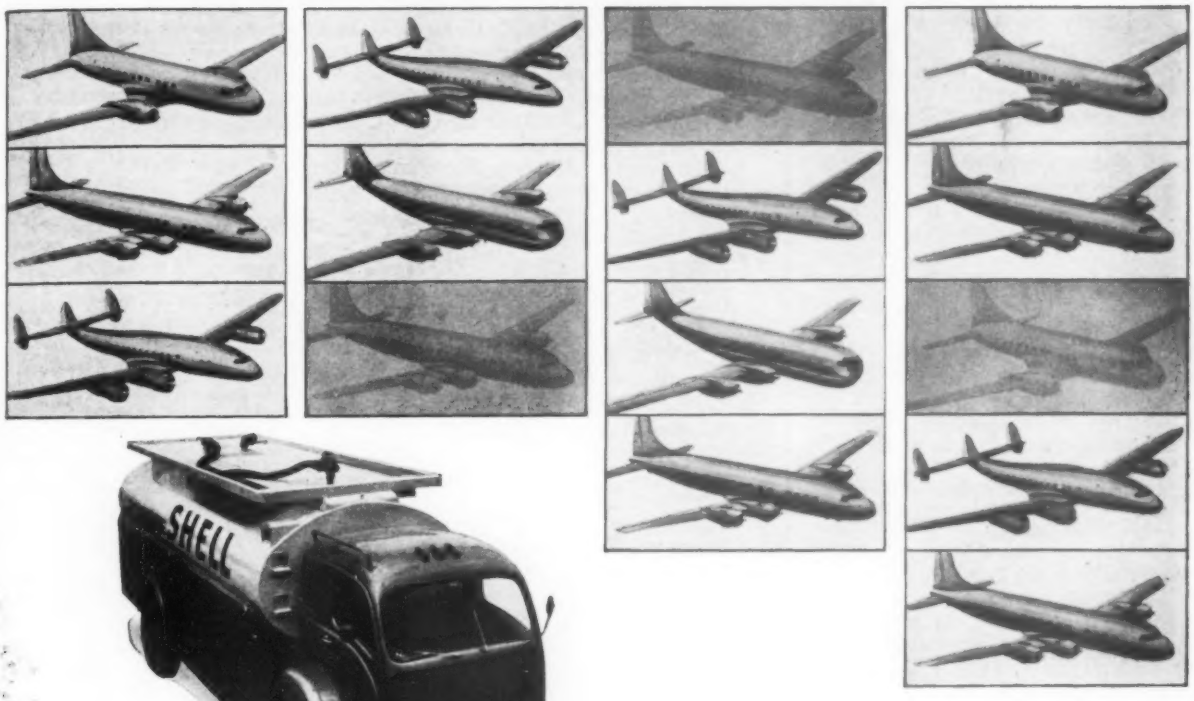

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New Formula for Mail Pay Shaping Up

Despite CAB objection, compensatory rate bill likely to pass.

By Katherine Johnsen

The Administration and Congress are at odds on key points in proposed legislation separating airmail pay from subsidy to air carriers.

The Civil Aeronautics Board's position, endorsed by the President and just recently presented to the Senate Interstate and Foreign Commerce Committee, focused attention on these controversial issues:

- What are compensatory rates.
- Who should set them.
- When it should be done.
- Subsidies to communities.
- Separation for international carriers.

I. Compensatory Rates

CAB would gear mail rates to the cost of the service, with allowance for a reasonable profit in addition.

This would mean:

- **Mail rates for the "big four"**—now under consideration by the Board—of between 40 and 45 cents a ton-mile.
- **Slightly upgraded rates** for the next largest carriers—Northwest, Capital, Delta, National, Braniff, Western.
- **Sharply higher rates** for other trunk lines and all local service carriers.

This is the basis:

There's a slightly graduated increase in cost per revenue mile as carriers' business drops from the 220 million revenue ton miles annually of American Airlines to the 18 million ton miles annually of Western Air Lines. But the cost per revenue mile skyrockets for the carriers with less than 15 million ton miles of business annually. This is because the smaller lines have heavy fixed costs for their volume of business.

▶ **New Rate Basis**—But Senate Interstate's Chairman Sen. Edwin Johnson, who is now carrying the ball for separation legislation in Congress, would gear mail rates to passenger rates.

He rejects, though, the proposal of the New York accounting firm, Ernst and Ernst, for a flat 50 cents a ton mile mail rate for all carriers. Ernst and Ernst argues that the passenger rate structure on all lines is the same; so the mail rate structure should be, too.

Johnson argues that "smaller carriers operating at small communities and

What Mail Pay Could Have Been

The following table shows (in thousands of dollars) the portion of mail pay to airlines during 1949 (last year for which final information is available) that would be marked down as compensatory, and the portion that would be subsidy under the Johnson separation bill that appears to have top priority for enactment.

The bill's rates are: for the "big four," 42 cents a ton mile; for the 12 regional trunk carriers, 63 cents a ton mile; for the local service lines, 84 cents a ton mile; for the international carriers, 80 percent of the mail revenue. Support to the carriers over and above the compensatory rate would take the form of direct grants.

	ACTUAL MAIL PAY	COMPENSATORY PAY	SUBSIDY PAY
Big Four			
American	$5,779	$3,732	$2,047
Eastern	3,246	2,052	1,194
TWA	5,719	3,690	2,029
United	6,482	4,362	2,120
Regional Trunklines			
Braniff	2,321	675.7	1,645
Capital	4,567	671.9	3,895
Chicago and Southern	1,800	327.9	1,472
Colonial	1,226	155.9	1,070
Continental	1,853	238.6	1,614
Delta	2,384	567.4	1,817
Inland	640.9	114.1	526.8
Mid-Continent	1,467	356.2	1,111
National	1,688	340.8	1,348
Northeast	1,565	164.3	1,401
Northwest	4,836	1,601	3,235
Western	1,863	283.3	1,580
Atlantic			
American Overseas	2,337	4,187.6	1,850
Pan American-Atlantic	4,311	9,708	5,396.7
TWA	4,518	9,228.7	4,710
Gulf & Caribbean			
American	195	95.6	99
Caribbean-Atlantic	39.7	209.7	170
Chicago and Southern	130.7	1,504.7	1,374
Colonial	46	342	296
Eastern	106	46.7	59
National	49	81	32
South America			
Braniff	126	1,503	1,377
Pan American-Latin America	4,168	7,225	3,057
Panagra	512.6	2,314	1,801
Pacific			
Northwest	2,975	5,665	2,689.7
Pan American-Pacific	8,726.6	11,765	3,038
Pan American-Alaska	678.6	1,343	664
United	1,153	588	565
Alaska			
Alaska Airlines	239	525.7	287
Alaska Coastal	35	129.7	94.6
Cordova	6	20	14
Ellis	11	124.7	113
Northern Consolidated	137	461	324
Pacific Northern	140.6	395	254.6
Reeve	111	96.6	14
Wien	49	368	319
Local Service Airlines			
Central	14	172	158
Challenger	63.8	983	919.7
Empire	44	655	610.7
Mid-West	6.7	99.6	93
Monarch	73	1,121.6	1,048
Piedmont	114	1,209	1,095
Pioneer	160	1,676	1,516
Robinson	32.6	588	555.7
Southwest	78	1,250	1,172
Trans-Texas	105.7	1,504	1,398.7
West Coast	40	721	681
E. W. Wiggins	3	25	22
Wisconsin Central	47	1,036	988
Helicopter Airlines			
Helicopter Air Service	3	98	95
Los Angeles Airways	35	423.7	388

with smaller aircraft will have higher costs—a factor that should be considered in mail rates."

He would group airlines into "five or six" categories by size. His new bill, introduced after seeing the Ernst and Ernst report, sets up three categories:

- **Major trunklines,** receiving 42 cents a ton-mile.
- **Regional trunklines,** receiving 63 cents.
- **Local service lines,** receiving 84 cents.

But he's since decided that more groupings would make for more equitable rates.

II. Who Should Set Rates

CAB vigorously protests Johnson's plan to set airmail rates by statute. But Congress is likely to insist on that method.

The Board contends that rates should be set by CAB after hearing. Statutory rates would be arbitrary. Be they too high or too low, it would take an act of Congress to change them. In the meantime, carriers might suffer under "confiscatory" rates. Or, on the other hand, the public treasury might be milked in excessive payments to the airlines. CAB-fixed rates could be amended to meet new conditions—such as cost increases due to inflation or cost reduction due to improvements in the route structure.

Johnson retorts: Passenger rates don't change with the winds, and neither should mail rates. The rates he proposes (42 cents a ton mile and up) are "most generous," particularly in view of the airlines' freight rate which he says is 20 cents a ton mile. "If we were to put it on a voluntary basis, I don't think there would be an ounce of mail waiting for someone to carry," he says. On the other hand, he suggests, "If the rates are too high, why not have the carriers give the traveling public a break and reduce fares?"

III. Action or Delay?

This is the heart of the differences between the Administration and Congress.

Congress' fundamental objection to letting CAB established compensatory rates for carriers, via the prolonged hearing route, is that it will take too long. CAB concedes it would take a $300,000 additional appropriation and well over a year to do the job for all carriers.

The economizing Congress doesn't want to grant the extra money nor to wait that long. The outlook now is that legislation setting up initial compensatory mail rates for all domestic carriers will go through Congress this session. However, it probably will give CAB considerable leeway in grouping carriers under the different rate categories.

IV. Subsidies to Communities

The controversy here is over the "method" of earmarking subsidies to air carriers as subsidies to communities that don't generate enough traffic to make service economic.

Both CAB and Johnson agree on the approach. A Senator since 1937, Johnson comments on the matter: "You know if CAB comes in for $50 million for subsidies to airlines, members of the appropriations committees are going to throw up their hands in dismay—unless you can point out that most of the subsidy is to support service to small communities, and outline services that will have to be eliminated if the funds are not granted. This approach is to protect the aviation industry."

► **Point of Departure**—But CAB protests the cost accounting and reporting method laid down by Ernst and Ernst and required under the Johnson bill for determining subsidy allocable to communities. They claim it will mean hundreds of additional forms and personnel, bogging carriers and the Board down in a swamp of red tape. CAB wants to make "approximations" of the portion of subsidy pay allocable to cities and towns with information already available.

V. International Carriers

CAB rejects Johnson's proposal to set international mail pay at 80 percent of the revenue from its transportation. (Carriers would be eligible for direct subsidy grants, in addition, under his bill). There's "no sound relationship" between the cost of the transportation and the revenue, the Board states.

Instead, CAB says, compensatory international mail rates should be geared to the cost of the service, the same as domestic rates.

Both Johnson and the Board agree separation for international carriers ought to wait until separation has been worked out for the domestic field.

Pilot, Airline Blamed In NWA Butte Crash

The Civil Aeronautics Board, after investigation of the Nov. 7, 1950 Northwest Airlines fatal crash at Butte, Mont., finds: "The pilot failed to follow the carrier's prescribed No. 2 instrument approach procedure to the Butte Airport, which procedure is approved by the Civil Aeronautics Administration."

The Board also lays some indirect blame on the airline, saying: "However, the company is responsible for the establishment and execution of a comprehensive pilot training program. . . . Certainly this program was not as effective as required. . . . As a result of this and subsequent accidents involving Northwest Airlines ,the Civil Aeronautics Administration took the following actions":

The CAA in January and February ordered Northwest to:

- **Raise weather minimums.**
- **Start concentrated pilot training.**
- **Inspect planes** more intensively.
- **Shorten reserve flight** distance requirements.
- **Restrict flight schedules** until completion of maintenance checks.

The most controversial question of the investigation was whether both the radio range and the radio fan marker

LIFTMASTER PROVES ITS NAME

Slick Airways hauled its heaviest single load when it recently transported this critically needed ten-ton 32.5-ft. tie-rod from Philadelphia to Aluminum Co. of America's Vernon plant at Los Angeles aboard its new Douglas DC-6A Liftmaster. The tie-rod and 3,500 lb. of accessories, needed for installation on an extrusion press, made the flight in 12 hr., compared with an earlier similar shipment by rail which took 11 days. It's also estimated it cost approximately $2,000 less to ship the big load by air.

could have been off kilter enough to have led the pilot into the ridge just below its top. The Board's conclusion is that the histories of performance of the Whitehall Range and the Homestake fan marker as set forth in the investigation of this accident preclude any question as to proper functioning during the period Flight 115 was approaching Butte.

► **No Multiple Trouble**—The Board also ruled out the possibility that "multiples" of the beam could have led the pilot astray. Multiples are false course signals lying to one or both sides of the centerline of the published course. The pilot's course as described by two witnesses was about two miles north of the beam but parallel to it all the way to the crash.

But the Board says: "investigation disclosed that such multiples exist on the west leg of the Whitehall range, and their existence has been long known, but they occur only to the west of the homestake marker. Provided prescribed approach procedures are followed, the multiples on the west leg of the Whitehall range do not constitute a hazard to flight, by virtue of their weakness, geographical location, and relatively small displacement from the true on-course signal."

► **On and Off**—The Board concludes that the pilot flew by sight instead of instrument—using an on-instrument-off-instrument technique through the variable weather with local snowstorms. So, the Board says, the plane probably struck the ridge in a local snowstorm. The Board speculates that the pilot may have mistaken an earlier ridge for the one he hit, and so he started letting down to Butte too early to make a proper landing.

There was no structural failure or power interruption prior to the accident, the Board finds.

Korea Airlift One Year Old

The Pacific Airlift to Korea—the world's longest aerial supply operation—celebrated a memorable first birthday July 1. It had seen the transport of some 91,500 passengers, more than 20,600 tons of cargo in 6,000 flights to and from the Far East across watery routes that at the shortest were 5,177 statute mi. (8,073 stat. mi. is the longest route)—all without a single crash or fatality.

At its peak the air fleet thrown together by the Military Air Transport Service operated about 250 planes and included 17 U. S. scheduled and nonscheduled carriers plus foreign carriers, among the Canadian Pacific Air Lines, Belgian Sabena, to RCAF.

What Local Service Airlines Are Doing

(17 Local Service Airlines 1st Quarter 1950 vs. 1st Quarter 1951)

	1950	1951
Traffic		
Passengers	157,211	280,247
Passenger Miles	31,865,000	59,849,000
Mail Ton Miles	117,358	161,529
Express Ton Miles	95,634	223,914
Freight Ton Miles	125,751	212,742
Total Ton Miles	3,451,992	6,427,648
Operating Revenues		
Passenger	$1,690,793	$2,959,775
Mail	3,760,807	4,161,154
Express	35,585	82,031
Freight	39,107	65,166
Other (Includes Charter)	81,937	442,329
Total Revenues	$5,608,229	$7,710,455
Operating Expenses	$6,119,944	$8,116,470
Net Operating Income	—$511,715	—$406,015
Selected Ratios		
Operating Expenses Divided by Operating Revenues	109.12%	105.27%
Revenue Ton Mile Receipts	162.46 cents	119.96 cents
Revenue Ton Mile Expenses	177.29 cents	126.27 cents
Passenger Miles Receipts	5.31 cents	4.96 cents
Mail Ton Mile Receipts	$32.05	$25.76
Express Ton Miles Receipts	37.21 cents	35.07 cents
Freight Ton Mile Receipts	31.10 cents	30.63 cents
Revenue Passenger Load Factor	23.11	32.10
Available Seat Miles	137,884,000	186,445,000

► **Build-up**—Just prior to the airlift, MATS was operating only 50 planes across the Pacific carrying about 70 tons a month to Japan. Within a month after hostilities broke out, about 95 tons of critical cargoes were being delivered daily, and by September, 1950 the figure climbed to 106 tons daily. The monthly average at July 1, 1951 was about 5,000 passengers and 1,700 tons of freight and mail. A great big plus factor must include the 21,500 combat wounded men and 6,500 other patients returned to the U. S. by air evacuation.

Probably the most crucial effort came last September, when Allied forces landed at Inchon and simultaneously broke out of the tight Pusan perimeter. That month the Airlift delivered 13,000 men and nearly 1,800 tons of war material to supplement the increased effort.

► **Participation Breakdown**—Here's how the airlift breaks down by participant for the period July 1, 1950-July 1, 1951: Commercial contract carriers carried 57,000 passengers, 11,000 tons of cargo (18,000 total tons) and made 3,500 trips.

Pan American World Airways, the biggest prime contract carrier and its subcontractor alone flew approximately 30,000 passengers and 11 million lb. of cargo on 968 Pacific roundtrips during the first year. The PanAm fleet, at its peak numbered 24 planes including planes and crews from EAL, Capital, Western, Panagra, American and American Overseas. This team flew 12,971,000 miles, averaged 10.56 hr. per day utilization. MATS carried 27,000 passengers, 8,700 tons of cargo (11,600 total tons) and made 2,000 trips. Other United Nations participants hauled 7,500 passengers, 900 tons of cargo (1,600 total tons) and made 500 trips. These figures represent operations to the Orient only.

It would not be fair to compare MATS' effort with the commercial carriers without realizing that at the start of operations military economies forced by budget slashes allowed MATS only enough money to utilize its planes on a 2.5 hr.-per-day basis, which was built up in about six months (because of supplemental appropriations) to an average of 6 hr. daily.

All-Weather Era Here, Say Experts

The ability of airlines or the military to complete any flight in any weather, an airman's dream ten years ago, has "for all practical purposes" become a technical reality, according to a panel of navigation experts who met recently in New York.

Air and ground equipment making this possible not only is at hand, but has already been proven in actual flight use.

Some of it already is standard at airports and in planes.

▶ **Sorting Job**—Some of it is just coming into use, some is in one place, some at another. It needs only to be sorted out and arranged into a single all around system, common at all airports and aircrafts, to have all-weather flight actually take place. The technical capacity to do this has been realized, but the event has not. Time to sort out the equipment, political and economic factors must be hurtled.

These views were expressed in a symposium on short-range air navigation held by the Institute of Navigation at its seventh annual meeting in New York. Moderator for the civilian and military experts on the 12-man panel was Col. S. A. Mundell, Air Force member, Air Navigation Development Board.

▶ **Two-tenths Off**—According to D. S. Little, Supervisor of Airway Aids at American Airlines, studies indicate that a proper combination of available air-ground equipment and implementation of certain procedures already tested would give his airline, practically speaking, an all-weather operation.

With present weather minimums as set by CAA, American could complete all but two-tenths of 1 percent of all scheduled flights, Little told the panel. And with other methods of setting weather minimums, this figure might be lower, he believes.

The airline could have 99.8-percent flight completion, he said, if this equipment was combined in a system in airplanes and at airports:

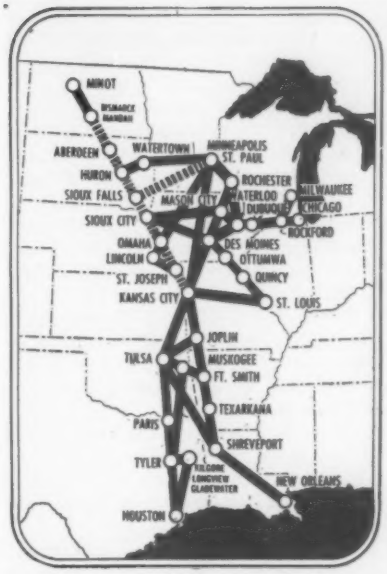
- **Approach lighting** of the type used at Newark Airport—installed to within 200 ft. of the runway.
- **Calvert runway** marking system as modified by Sperry.
- **High-intensity runway** lighting, closely spaced as at Newark Airport.
- **Automatic approach equipment** in the airplane.

Along with this, it is assumed that a proper combination of GCA-ILS equipment will be in use and that approaches to the runways will be clean. In a purely technical sense, we have reached the all-weather era, says Little.

▶ **AF Report**—Using weather minimums of 500 ft. as the limiting factor, the Air Force in 1,000 flights managed to complete all but one-half of one percent with present equipment, Col. Mundell told the panel.

Several military members saw the desirability of further miniaturization of these all-weather navigational aids in small jet fighter planes. But they agreed that the 150 lb. or so of added weight now would be more than offset by savings in fuel gained through more accurate, precise navigation.

In this regard, Little told the panel that recent developments in naviga-



MCA'S RAPID GROWTH

How Mid-Continent Airlines has nearly quadrupled the number of cities it serves in only 15 years is graphically depicted in the above map. The dotted lines indicate the carrier's status as of July 1, 1936; solid lines show MCA's expansion since then—to 34 cities on its 15th anniversary. And on July 15, the carrier adds Lincoln, Neb., (also shown) to make it 35.

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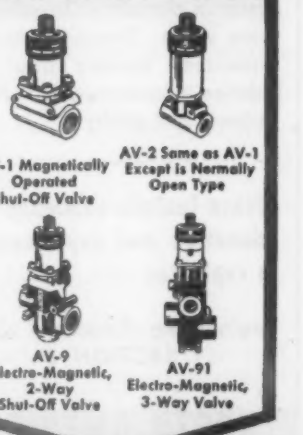

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tional aids played an important part in permitting American Airlines to cut down by 100 gal. fuel reserves carried in its DC-6s.

▶ **Near-Zero Landings**—Air Force Capt. J. L. Anast of the Air Materiel Command's All-Weather Flying division reported on results of hundreds of flight tests conducted by the Air Force to determine effectiveness of present ground-air navigational aids under minimum ceiling and visibility conditions.

These important tests showed landings could be made safely on GCA alone or on ILS (monitored by GCA) with ceilings at 200 ft. with the plane flown manually.

With the same equipment and the plane approaching under automatic control, landings were made safely with a ceiling (visual vertical contact) of only 100 ft.

With 2,600 mc Microwave equipment developed by Sperry Gyroscope Co., tests showed letdowns under automatic approach could be made safely with ceilings of only 60-70 ft.

▶ **Golden Age**—It was brought out during the three-day meeting which covered all aspects of navigation that the guided missile presents the most challenging problems in navigation today, and is likely to be responsible for the most significant advances in navigational science in the future.

This is a period that future historians may call the "Golden Age" of navigational science, Paul Rosenburg, President of the Institute, believes. Spurred on primarily by military and aeronautical needs, navigation has emerged from the state of an art to that of a science, he says.

Dr. E. G. Bowen, chief of the Radiophysics Division of Australia's national research organization, was voted the Thomas L. Thurlow Award for 1950 by the Institute, for outstanding development work in aerial navigation and traffic flow studies.

The panel was unanimous in the view that present methods of measuring weather mean nothing to the pilot for low-ceiling approaches and that there is a serious need for revision of these methods. The view from the cockpit is not always the same as from the ground.

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SHORTLINES

▶ **All American Airways**—Will get $900,000 in back mail pay. Board recommendation includes $771,000 Mar. 7, 1949 to May 31, 1951 and $162,000 for the old mail pick-up route operation Apr. 14, 1948 to June 30, 1949.

▶ **Air Transport Assn.**—Reports a 50 percent gain in interline traffic business of scheduled lines through the Airlines Clearing House in May, compared with a year ago. Billings total $24,764,587 in May 1951. This is a 7 percent gain over April.

▶ **American Airlines**—Carrier says, regarding Eastern's fourth bid for a southern transcontinental route: Eastern "seeks a monopoly of one-carrier service all the way across the country at the expense of five other carriers." Actually, American now has a monopoly on the western portion of its transcontinental one-carrier service; all the through-plane passengers of the other four lines must go American half way across the country, heading west, or start on American heading east.

▶ **Braniff International Airways**—President T. E. Braniff estimates his airline will report $800,000 earnings for the first half of this year, double previous first-half record.

▶ **Civil Aeronautics Administration**—Has asked bids for purchase of its Lockheed Constellation. Plane has almost no flight time—was used for ground instruction.

▶**Continental Air Lines**—Passenger revenue in May hit an all-time high of $469,193—up 45 percent over a year ago. Number of passengers carried gained 29 percent—to 22,662. Revenue passenger miles at 7,952,416 were up 34 percent; mail ton miles of 25,495 were up 46 percent, express ton miles of 12,100 up 11 percent over May, 1950.

▶**International Air Transport Assn.**—Transactions through IATA clearing house in April were up four percent over a year ago to $11,488,000. Total turnover the first four months of 1951 is up to 20 percent to $48,404,000.

▶**Modern Air Transport**—Large irregular carrier asked CAB for special permission to fly United Air Lines' routes during the strike. CAB took no action.

▶**National Airlines**—Says it can clear $1 million a year on just one daily round-trip daylight air coach service on DC-6 aircraft with 68-passenger seating capacity, at $58 one-way fare Miami-New York. At CAB oral argument on National's application, Eastern repeated it opposed the daylight coach, but would jump in with 81-seat Constellations if CAB approved NAL's request. Eastern, Delta, Capital and Northeast say daylight coach must lead to general fare reductions because of "chain-reaction" competition.

▶**Northwest Airlines**—Has asked CAB permission to make a stop at Chicago on Route 3, between Detroit and Milwaukee. That would let Northwest offer transcontinental service via Chicago. . . . All members of NWA's board of directors have been re-elected at annual stockholder meeting.

▶**Pan American World Airways**—CAB has once more denied Pan Am's application to fly non-stop Asuncion-Caracas (Paraguay-Venezuela). . . . Pan Am has threatened to delay the CAB-proposed National-Panagra interchange New York-Balboa and south by going to the courts—Pan Am counsel has said Pan Am may "refuse to cooperate" in its part of the route and service hook-up.

▶**Trans-Pacific Airlines**—Hawaiian intra-island carrier has a CAB-proposed mail rate starting June 1, 1951 at 25.82 cents a mile maximum, down to 10.63 cents a mile at high load factor of 70 percent. Carrier only recently won CAB approval of its application for certification to carry mail, saying it could not stay in business unsubsidized against the "subsidized" Hawaiian Airlines. TPA gets a lump sum payment of $13,523 for the two weeks to May 31, 1951.

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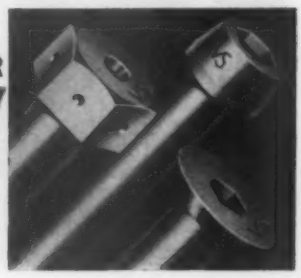

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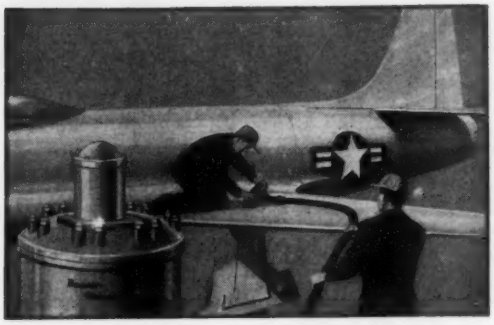

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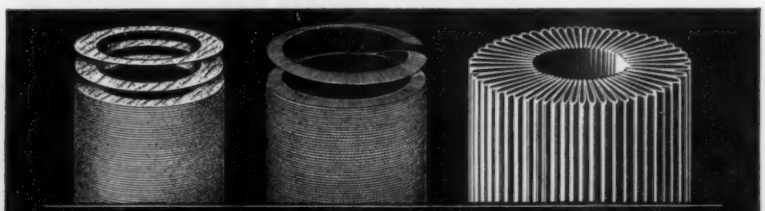

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AVIATION CALENDAR

July 9-13—Armed Forces Procurement Clinic, St. Louis, Mo.

July 17-18—European ignition conference, sponsored by Lodge Plugs, Ltd., Savoy Hotel, London, England.

July 23-24—Fifth annual meeting, University Aviation Assn., University of Florida, Gainesville, Fla.

July 24-28—Armed Forces Procurement Clinic, Cleveland.

July 28-29—Dedication of new Oneida County airport, Oneida, N. Y.

Aug. 6—International air race for the Daily Express Cup, England.

Aug. 11-19—Eighth annual Michigan aviation week, sponsored by the Aero Club of Michigan.

Aug. 15-19—Fifth annual all-woman transcontinental air race, sanctioned by the Ninety-Nines, Sana Ana, Calif., to Detroit, Mich.

Aug. 18-19—National Air Race, Detroit, Detroit-Wayne Major Airport.

Aug. 22-24—Western convention of Institute of Radio Engineers and Seventh Annual Pacific electronic exhibit.

Aug. 22-26—International convention of the Ninety-Nines, Mackinac Island, Michigan.

Aug. 24-26—Fifth annual convention of the Air Force Assn., Ambassador Hotel, Los Angeles, Calif.

Sept. 3-7—Royal Aeronautical Society-IAS third international aeronautical conference, Brighton, Sussex, England.

Sept. 10-14—Sixth national instrument conference and exhibit, sponsored by the Instrument Society of America, Sam Houston Coliseum, Houston, Tex.

Sept. 10-16—Seventh annual general meeting of the International Air Transport Assn., Westminster School, London, England. Program includes one-day visit to SBAC Farnborough show.

Sept. 11-16—Twelfth flying display and exhibition of the Society of British Aircraft Constructors, Farnborough, England.

Oct. 2-4—Seventh annual aircraft spark plug and ignition conference sponsored by the Champion Spark Plug Co., at Toledo, Ohio.

Oct. 8-10—Special conference on aircraft electrical applications, sponsored by the Air transportation committee of the American Institute of Electrical Engineers and the Los Angeles section of the Institute, Hollywood Roosevelt Hotel, Hollywood, Calif.

Oct. 16-17—Fourth annual New York State conference on airport development and operation, sponsored by the N. Y. State Dept. of Commerce, N. Y. Aviation Trades Assn., Assn. of Towns of the State, Conference of Mayors, County Officers' Assn., and the N. Y. State Flying Farmers, Onondaga Hotel, Syracuse, N. Y.

Oct. 29-30—Air Industries & Transport Assn. of Canada annual general meeting, Seigniory Club, Montebello, Quebec.

PICTURE CREDITS

9—(Bell H-13D) Bell Aircraft; 13—(Behnecke) Wide World; 15—Wide World; 17—McGraw-Hill; 18—(SA-16) Erwin Bulban; 25—McGraw-Hill World News; 30—National Bureau of Standards; 39—Consolidated Vultee.

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1276	10759	Bolt
900	11210	Cover
100	11762	Guide
1157	35787-5	Bushing
2174	35787-10	Bushing
814	35814	Blower Assy.
3967	35817	Spring
280	35855	Cap
2446	35924	Washers
4200	35932	Gasket
22	36759	Rod Assy.
182	46400E	Liner
30	48346	Cylinder
1475	48360	Bearing
53	48362	Shaft
175	48363	Shaft
100	48389	Fitting
209	48390	Retainer
56	48392	Sump
333	48447	Bushing
107	48457	Adapter
390	48461	Gear
149	48468	Bearing
90	48468B	Bearing
389	48469	Bearing
470	48470	Bearing
75000	51506	Plug
395	54847	Clamp
71	57006	Cover
78	76236	Gear
565	81397	Tube
10736	84185	Cover Assy.
261	84235	Pipe
155	84281	Spacers
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87	84567-8	Stud
77	84591C	Nose Housing
178	84602	Bracket
30	84702	Shroud
397	84752	Bearing

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Quantity	Part No.	Description
35	RA-10-DB	Receiver
20	TA12B	Transmitter
150	DA-1F	Dynamotor
35	MR-9B	Control Box
9000	45	Bulb
11000	1667	Bulb
1000	987	Bulb
300	AN3135-1	Bulb
97	FT213A	Mount
29	FT293	Mount
80	BX42-7	Dynamotor
6	RTA-1B	Transceiver

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19	M870036B Cylinder CO^2 Wt. Empty 5.48 lbs. Wt. of Charge 3.62 lbs.
22	982512 Cylinder CO^2 w/valve Wt. Empty 11.65 lbs. Wt. of Charge 7.25 lbs. Valve number 979453 J
96	992255 Cylinder CO^2 (type 5A-hand fire extinguisher) Full wt. 14.3 lbs.
93	923748 Oxygen cylinder (full) w/valve #X4015 Charges to 1800 PSI
150	982056 Valve 1-1/2" flare tube threads
150	966129 Solenoid (28 Volts)
225	981591 Gate Valve With 3 1-1/2" Flare tube threads
151	876082 (Model A4614) pressure switch Manually or pressure operated
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400	AN 5780-2	Weston Model 882-P N111602 Description as above
1500	AW 2-65B	U. S. Gauge Air Pressure Gauge (0-2000 lb.)
160	2E-492E	Pesco fuel pumps
700	TFD 8600	Thompson fuel booster pump
125	D-7818-	Adel anti-ice pumps
170	2-P-771-A	Pesco fuel pump AN4102-1
250	AN4014	Erie Motor Systems D-3 hand wobble pump
300	1H960k and KA	Pesco Hydraulic hand pump
478	D9530	Adel selector valve
233	D9530-2	Adel selector valve
428	D9560-2	Adel selector valve
744	D10044	Adel selector valve
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2000	AN 3096-4	Grimes Light assembly
800	AN 3096-5	Grimes Light assembly
380	AN 3096-6	Grimes Light assembly
175	EE 709-M2	Air associates Motor
115	P4CA2A	Parker Primer
80	AN 3213-1	Scintilla Ignition switch
568	A-9 (94-32226)	Ignition switch
687	RS-2	Mallory Selector boxes
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1900	13018A	Interphone Box
244	D10051	Selector Valve (Adel)
135	10996A	Instrument Panel for Republic Seabee
144	K14949E	Windshield Wiper Kit (Marquette Metal Products)
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WHAT'S NEW

New Books

Aircraft Jet Powerplants, by Franklin P. Durham, is a meaty and effective roundup of the subject, primarily slanted as a text for junior and senior undergraduate courses.

The author, assistant professor of aeronautical engineering at the University of Colorado, uses basic mathematical development for the short overall treatment of jet propulsion and gas turbine principles, jet engine components, and ramjets and rockets. Compressible gas flow is not treated as a separate subject, but applied where relevant. A knowledge of elementary thermodynamics and fluid mechanics is necessary for full appreciation of this text and familiarity with basic aerodynamics would be helpful.

Problems at the end of chapters serve a worthwhile review purpose. Illustrations are in keeping with the general purpose of the work, which emphasizes fundamentals without encumbering details.

Publisher is Prentice-Hall, Inc., New York. 326 pp. Price is $6.65. —IS

Aircraft Propulsion Powerplants, by Lawrence T. Cargnino and Clifford H. Carvinen. Publisher, Educational Publishers, Inc., St. Louis; 591 pp.; price $6.50.

This is a comprehensive compilation of descriptive and operational details of aircraft engines and associated systems, slanted to give a preparational grounding to the aircraft mechanic and student in maintenance. Instructors in aircraft engine schools will also find this a good reference work.

The book, in the main, is concerned with reciprocating engines, devoting the last chapter to a general discussion of jet powerplants.

Inspection, operation and trouble-shooting and engine overhaul, repair and servicing are compactly covered in two separate chapters.

The subject is profusely illustrated. —IS

Airplane Aerodynamics, by Daniel O. Dommasch, Sydney S. Sherby and Thomas F. Connolly. Publisher, Pitman Publishing Corp., N. Y.; 520 pp.; price $6.50.

This book was suggested by material covered in lectures delivered during the academic phase of the course at the Test Pilot Training division of the Naval Air Test Center.

The book presents methods of aeronautical engineering, and is generally aimed at pilots who are not aeronautical engineers, establishing the relationship between academic theory and flight experience. It is designed for students having a background in college physics, mathematics, calculus, mechanics and dynamics. The mathematical approach is used but practical data are given to insure an integrated picture. Problems (and answers) are also included in the text.

Coverage of the work is thorough and runs from fundamentals through the various facets associated with aeronautical engineering considerations and airplane components. The book offers the opportunity for extensive familiarization, on an academic plane, with the fast-moving progress being made in aerodynamics. —IS

Conference Report

Proceedings of the Conference on Ground Facilities for Air Transportation (Compilation of technical papers); 220 pages; $2.00. Purchase from Prof. A. J. Bone, Dept. of Civil and Sanitary Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

In September, 1950, a three-day conference on ground facilities for air transportation was held at the Massachusetts Institute of Technology. Co-sponsors of the conference were the Civil Aeronautics Administration, the Port of New York Authority, the Massachusetts Aeronautics Commission and MIT.

The proceedings of the conference—36 technical papers and summarized discussions—recently have been published in a single volume.

There is much in the book of value to airport planners and engineers, but perhaps most stimulating are the occasional glimpses into the future of airport design provided by the various authors. Illustrations include architect's renderings of airport buildings and plans.

This would seem to be a book essential to anyone in any phase of airport design.

Telling the Market

Spearhead for Defense is profusely illustrated, spiral-bound account of A. V. Roe Canada's work on jet transports, fighters and engines, with interesting historical references. Write the company at Box 430, Terminal A, Toronto, Canada.

The Lear L-2 Autopilot is a handsome booklet telling the story of this device, and taking the reader along on an actual L-2 navigated flight. The booklet is especially geared to personal plane users. Write Norman Warren, Lear, Inc., 11916 West Pico Blvd., Los Angeles, Calif. . . . **How to Prepare Your Plant For Atomic Attack** is a 32-page illustrated booklet on industrial plant security in event of A-Bomb assault. It is aimed specifically at management and safety personnel. Address Walter Kidde & Co., Inc., Dept. A, 675 Main St., Belleville, N. J.

LETTERS

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Praise

Our entire organization joins in a hearty "Thank you" for your editorial regarding the Cosmopolitan article roasting nonscheduled airlines.

Your comments are very well expressed and we endorse them completely; we too would like to know Mr. W. B. Courtney's background in aviation.

The crushing regulations and proceedings against us, collectively and individually, are about to erase large irregular carriers from the aviation picture. The crying need of the public for low cost air travel is ignored under the pressure of scheduled airline lobbying and general red tape in aviation bureaus. Too late will come the question, "What happened to all those low-priced airlines that used to be around." Perhaps Mr. Courtney will have another article in Cosmopolitan giving the answer.

Again our sincere thanks for the boost to our morale; it is good to find someone cognizant of the true facts and willing to print them.

I. E. HERMANN, President
Great Lakes Airlines, Inc.
Lockheed Air Terminal
Burbank, Calif.

. . . We certainly appreciated the fine story on the Panoramic Camera which appeared on page 32 of your Mar. 26 issue. A grade-A job like that is extremely satisfying both to us and to the Perkin-Elmer Corp. . . . In my opinion, Scott Reiniger did a fine bird-dogging job at the plant. He has material in this article that exclusively appears in AVIATION WEEK.

JOHN SASSO
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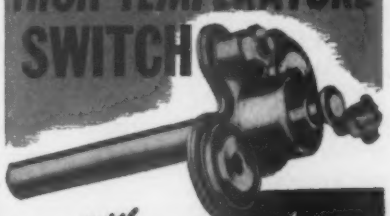

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EDITORIAL

A President Can't Be Wrong?

The Joint Chiefs of Staff are our top military advisers. They have at their finger-tips the combined experience and resources of the three military services. In addition, the JCS have their own staff that numbers several thousand persons. They, better than any other three men in the United States, should be able to furnish expert military advice to the President of the United States. It is as much their duty to give this advice as it is for the President to ask for it.

In all the thousands of words testimony taken during the MacArthur hearings, it has been apparent from the number of fence-straddling answers and the hair-splitting phraseology by the three members of the JCS, as well as by General Marshall, Defense Secretary, that all of them are "protecting" the President.

It now appears clear that President Truman, with Secretary of State Acheson, made the decision to take a stand in Korea, despite our own official White Paper several months earlier, clearly omitting Korea from our defense periphery. The original military decisions that had brought about our evacuation of Korea had been based on the best judgment of our military men.

The record of the MacArthur hearings shows that never at any time did the JCS recommend that we go back into Korea. The record also indicates in several places that our top military men had genuine qualms about the ability to make any progress in any Korean combat.

Regardless of how the Korean episode ends—if it ever does—one fact deserves emphasis:

While the Joint Chiefs of Staff, our top military advisers, never recommended any Korean campaign, neither did they apparently recommend against it to the President.

It is not an encouraging thought for the future. One man—no matter how wrong he might be—can overawe the best military brains we have—merely because he is President. Especially if those military men don't have the courage of their convictions.

No Compromise With Safety

Military Air Transport Service is installing rearward-facing seats in its 20-odd Boeing C-97 personnel transports. It says studies indicate this arrangement improves human survival chances in accidents.

It is seldom that we see military aviation take the initiative in an important safety problem that is common to the air transport industry, as well. In commercial aviation safety is synonymous with existence itself. In military aviation, safety refinements must frequently give way to considerations of higher military priorities, such as bigger bomb-loads, space and weight for guns, navigation and radar equipment, and range. MATS is to be congratulated for taking a revolutionary measure its own studies advise in the interest of passenger safety.

Some airline and aircraft manufacturing people are not happy about rearward-facing seats. Obviously, they have not studied the subject as carefully as MATS, or have not been as easily convinced.

They say many people don't like to "ride backward" and won't pay to fly if they feel they must face the rear. If the entire industry switched over, it's said a lot of us won't fly any more. If only a part of the industry switches, these skeptics say those who do will lose business to those who don't.

And if the subject is even publicized and discussed, 'tis said the public will become more "crash conscious" and will stay out of planes on that account, too. No one denies that to turn many or all seats around in a thousand modern transport planes will cost a lot of money.

It is a knotty problem for the airlines. Of that, there is no doubt. But it must be faced sooner or later. If the evidence is convincing for rearward-facing seats—and some very respected safety engineers tell us it is—then it is obviously up to the operators to take the step, and at the same time do a sound job of positive, constructive education of the public.

We suspect the industry might be surprised. Passengers may prove to be more interested in bettered safety chances than in their own previous habits or prejudices.

At any rate, there can be no compromise with safety.

Saucers Are Interesting

It may be quite true, as one reader wrote us, that the subject of flying saucers is too frivolous to deserve editorial space in AVIATION WEEK. The saucer subject was discussed here June 25.

But, important or not, a lot of readers like to read about the subject. Our mail proves that since June 25. Some believe in saucers devoutly, and maintain the fond hope not only that the whole story is yet to be told, but that AVIATION WEEK will tell it.

Maybe editorials should only be written about subjects and problems that everybody agrees are weighty and complex. Or that people should be interested in, but aren't.

We remain open minded on the subject, despite the critical letters. Their comments are outnumbered by the saucer fans. Now is the time for defenders of the reality of saucers to come to the aid of their favorite topic. Or are all saucers just Navy balloons? How about more letters from you readers!

—Robert H. Wood

NEW Sperry Signal Source

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A new *Microline* instrument, Model 555 Klystron Signal Source, is an extremely well-regulated power supply. It features a continuously adjustable beam supply from 250 to 3600 volts. In addition, a reflector power supply is continuously variable from 0 to 1000 volts, and a control electrode supply is continuously variable from 0 to 300 volts. The versatility of this signal source permits operation of low voltage as well as high voltage klystrons.

Several types of modulation are provided with this instrument: sine wave at 60 cps, 0-300 volts peak to peak; saw tooth wave continuously variable from 600 to 1050 cps, 0-300 volts peak to peak with 15 microseconds decay time; and square wave continuously variable from 600 to 1050 cps, 0-300 volts peak to peak with 5 microseconds maximum rise and fall time. A modulation selector switch on the front panel permits external choice of type of modulation.

Write our Special Electronics Department for further information on Model 555 as well as other *Microline* instruments.

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2K29	726A,B,C	QK-292
2K33	QK-140	QK-293
2K39	QK-141	QK-294
2K41	QK-142	QK-295
2K42	QK-143	QK-306
2K43	QK-159	6 BL6
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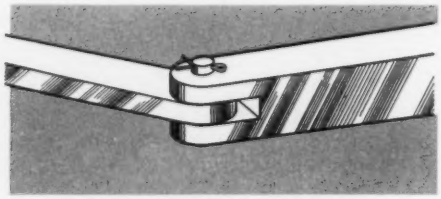
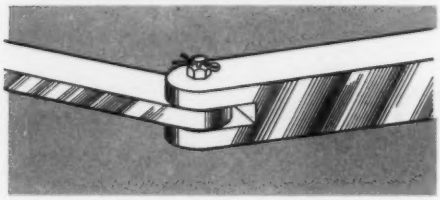
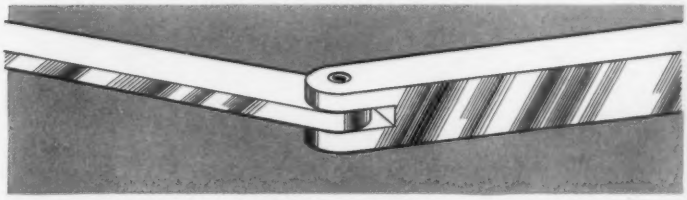
How to replace hinge pins and cotter pins with ROLLPIN self-locking fasteners

Rollpin replaces hinge pin for faster assembly of hinges. Inexpensively and simply driven in place, it cuts assembly costs. Constant spring tension holds Rollpin firm against vibration on heavy-duty automobile door hinges—on lightweight sheet metal hinges for meter or instrument panel covers.



IF YOU DO THIS ▲ *OR THIS* ▼ . . .





TRY THE ROLLPIN WAY INSTEAD . . . Rollpins offer many advantages as pivot and clevis pins for linkages or yoke assemblies. Heat-treated to provide excellent fatigue resistance and wear characteristics, Rollpins fit flush, grip firmly in the outer or inner members, depending on your design requirements, and are simply, inexpensively pressed in place. They are faster to install than cotter pins or safety wire . . . straight edges protect workers' fingers and clothing. Rollpins are readily removed with a punch . . . can be used again and again . . . assure simplified maintenance.

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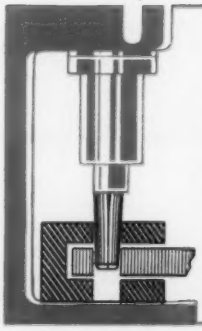

HERE'S HOW ROLLPINS PROVIDE A VIBRATION-PROOF FIT

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